The trauma of trauma: a prospective study of psychological distress following physical injury

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Submitted in partial fulfilment of the requirements of the Degree of Doctor of Philosophy

May 2015

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Abstract

Background: People who experience physical trauma face a range of psychosocial outcomes. These may be overlooked by busy clinicians. While some risk factors are understood, our understanding of the psychological effects of violent injury remains limited. Furthermore, there has been little research on the effect of facial trauma. Although changes to appearance can be distressing, the effects of these have not been studied in traumatic injury patients.

Aims: To establish the prevalence and persistence of psychological distress and appearance concerns following injury. To compare the psychological outcomes in i) violent and accidental injury and ii) facial and other injury, and iii) to identify explanatory risk factors for psychological distress.

Methods: Participants were adults admitted to the Royal London Hospital with traumatic injuries. Two hundred and twenty five participants (225) completed questionnaires in hospital. Follow up was at three months (*N* = 100) and six months (*N* = 112). Standardised measures were used to assess symptoms of post-traumatic stress (PTSS) (Acute Stress Disorder Scale, PTSD Checklist), depression and anxiety (Hospital Anxiety and Depression Scale), and appearance concern (Derriford Appearance Scale). Explanatory measures were collected, including history of mental health. Data were analysed in logistic and linear regressions, using multilevel models.

Results: PTSS and depressive symptoms affected 28% and 33% respectively at baseline. At six months, 27% and 31% respectively reported these symptoms. After adjusting for demographic factors, violent injury was associated with increased PTSS (*OR* 6.44, *CI* 1.75 to 23.75), depressive symptoms (*OR* 4.78, *CI* 1.41 to 16.18) and appearance concern (β 2.78, *CI* 0.09 to 5.47). A history of mental health problems increased distress.

Conclusions: There were high levels of psychological distress in this sample. Violent injury was associated with a complex interaction of social and psychological factors. People vulnerable to distress may benefit from psychological support. Hospital admission provides a unique opportunity to engage them in interventions.

Statement of originality

I, Emmylou Rahtz, confirm that the research included within this thesis is my own work or that where it has been carried out in collaboration with, or supported by others, that this is duly acknowledged below and my contribution indicated. Previously published material is also acknowledged below.

I attest that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge break any UK law, infringe any third party's copyright or other Intellectual Property Right, or contain any confidential material.

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Publication arising from this thesis

Shiraz, F., Rahtz, E., Bhui, K., Hutchison, I., & Korszun, A. (2014). Quality of life, psychological wellbeing and treatment needs of trauma and head and neck cancer patients. *The British Journal of Oral & Maxillofacial Surgery*. doi:10.1016/j.bjoms.2014.03.019

Acknowledgements

First and foremost, I wish to thank the several hundred patients who took part in this research. I was awed by their stories and humbled by their willingness to be involved.

This work was supported by Saving Faces, the Facial Surgery Research Foundation. I am grateful to Iain Hutchison and everyone else at Saving Faces for championing this research and their PhD students.

My supervisors, Ania Korszun and Kam Bhui, gave me guidance and feedback throughout. I thank them for supporting me through this first step into an academic career. Many people in the Centre for Psychiatry helped with little and big things: special thanks to Lisa Kass, Lisa Coward, Amarjit Sagoo and Jane Archer.

I would like to thank the clinical leads in oral and maxillofacial surgery, Iain Hutchison, and in major trauma, Karim Brohi, and everyone who worked with them during the time that I was recruiting patients. The medical world was new to me, and there were many people working at the Royal London Hospital who helped me find my way around, identify eligible patients and understand all the medical acronyms.

Several students helped with aspects of the project, including recruitment, data entry, and a qualitative analysis of field notes. I thank Hannah Skinner, Virginia Kopeschny, Amy Bernadette Fernandez, Saiam Ahmed, Shobana Sivalingam and Tasqeen Ahmed for their work.

The postdocs and fellow PhD students in the office were a great source of support. In particular, Farah Shiraz, Neil Smith, Amanda Fahy, Mel Smuk, Ann Marie Brady and Raluca Topciu gave me practical advice, motivation, and lots of light relief.

Many friends and family members kept an eye on my work-life balance, and I thank Madeleine Rahtz, Ben Rothwell, Serena Curmi, Maria Smedstad and Michael Hormann especially.

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List of abbreviations

AIS	Abbreviated Injury Score
ASD	Acute stress disorder
ASDS	Acute Stress Disorder Scale
AUDIT	Alcohol Use Disorders Identification Test
Brief COPE	Inventory of coping mechanisms
CPQ	Close Persons questionnaire (social support)
CTQ	Childhood Trauma Questionnaire
DAS24	Derriford Appearance Scale (24 item version)
DSM	Diagnostic and Statistical Manual of Mental Disorders
GCS	Glasgow Coma Score
HADS	Hospital Anxiety and Depression Scale
HADS-A	Hospital Anxiety and Depression Scale – Anxiety subscale
HADS-D	Hospital Anxiety and Depression Scale – Depression subscale
HDU	High Dependency Unit
HI	Head injury
ICU	Intensive Care Unit
IES/IES-R	Impact of Events Scale/-Revised Version
ISS	Injury Severity Score
LTE	List of Threatening Experiences
TBI	Traumatic brain injury
NCEPOD	National Confidential Enquiry into Patient Outcome and Death (report)
OMFS	Oral and Maxillofacial surgery
PCL-S	Post-traumatic Stress Disorder Checklist – Specific version
PMH	Past Mental Health
PTSD	Post-traumatic stress disorder
PTSS	Post-traumatic stress symptoms
TARN	Trauma Audit and Research Network
WEMWBS	Warwick Edinburgh Mental Wellbeing Scale
WHO	World Health Organisation
MDE	Major depressive episode
WHOQOL	World Health Organisation Quality of Life

Introduction

Traumatic injuries, whether from accidents or interpersonal violence, have psychological as well as physical consequences. Some aspects are understood, and post-traumatic stress disorder (PTSD) is known to affect up two fifths of patients. However, post-injury symptoms can have a complex course. Both violent and accidental injuries are more likely to affect certain groups, particularly young men, and people with existing social difficulties such as alcohol or substance misuse, or socio-economic deprivation. In addition to PTSS, there may be comorbid psychological symptoms. Psychological problems are not routinely assessed, and symptoms may be overlooked in busy wards and clinics.

This study examines under-explored aspects of psychological outcomes after trauma. The focus is on adult civilian trauma patients, admitted to the Royal London Hospital in East London. The aims of the project are to:

- Measure the prevalence of psychological distress, and understand issues of appearance concern;
- Compare psychological outcomes between people injured violently and those injured accidentally;
- Compare psychological outcomes following facial injury and other injuries.

The study's outcomes are psychological distress and appearance concern. Psychological distress includes post-traumatic stress symptoms (PTSS), and depressive and anxiety symptoms.

The research aims are evaluated in two studies:

1. The cross-sectional pilot study;
2. The main prospective study.

The pilot study provides cross-sectional data on the prevalence of distress. The participants are a sample of facial trauma outpatients attending an oral and maxillofacial surgery (OMFS) clinic. The pilot study informed the larger prospective study.

The prospective study forms the body of the thesis. It tests the study's hypotheses in a larger sample, and provides longitudinal data. The participants are inpatients being treated for major trauma or OMFS trauma. A range of explanatory measures is used to understand the outcomes.

Chapter 1: Review of the literature and discussion of the findings grouped by major trauma, facial trauma, and appearance concern, and provides local context. This chapter also sets out the project's aims and hypotheses.

Chapter 2: Description of the pilot study in its entirety, including methods specific to that study, results and discussion.

Chapter 3: Methods specific to the prospective study are described including the participants and procedure with a discussion of data analysis.

The results are presented over the next three chapters. At the end of each chapter, the results are discussed, including any limitations.

Chapter 4: Characterisation of the sample: presenting the clinical and demographic data on participants, and exploring associations between these. The prevalence of distress is presented, fulfilling one of the study's aims. Data from the explanatory variables are described.

Chapter 5: The univariate analyses of the four psychological outcomes. These analyses are carried out on the full baseline sample. The outcomes are assessed in relation to physical, demographic, and psychological measures. The chapter includes post-hoc analyses to test for associations between physical, demographic and explanatory variables. This section answers the study's aim to understand the effects of explanatory variables on psychological outcomes.

Chapter 6: Testing the study hypotheses. Using the evidence from the univariate analyses, adjusted statistical models are fitted for each of the four outcomes.

Chapter 7: Overall discussion, synthesising the findings to present core themes. Discussion of the implications for future clinical practice and research, and conclusion.

1 Literature review and project aims

The literature review provides an analysis of research on psychological responses to physical trauma. The key concepts of traumatic injury, violence, and the psychological outcomes are outlined. This is followed by a review of the research into psychological distress, in three parts: major trauma; the smaller field of facial trauma; and relevant research on appearance concern.

The chapter concludes with a summary of the available research and highlights remaining gaps in our knowledge and understanding. The hypotheses of the present study are formulated from this evidence.

Article search strategy and selection criteria

This is a narrative literature review. A broadly structured approach was used to the literature search; however, the numbers of articles identified, selected and discarded were not recorded. Primary searches used a set of keywords to identify relevant papers. The terms are shown Table 1: each search used one term from the patient samples in Column 1 and one from Column 2.

Table 1: Search terms used in literature review

Column 1	Column 2
trauma	psychology
major trauma	PTSD
injury	depression
facial trauma	anxiety
facial injury	appearance
OMFS	disfigurement
	violence

A high proportion of articles were discarded based on title, for example if they related to surgical rather than psychological outcomes. Further exclusions were made if the abstract showed that the research dealt primarily with a different, and not directly relevant, patient group, for example, people who had experienced abuse, war veterans, or face transplantation patients. This was common due to the varied usage of the term 'trauma'. Articles not written in English were excluded, with a few exceptions in facial trauma, where English language abstracts and reference lists were consulted.

There was limited literature on the psychological effects of facial trauma, so all published studies were consulted. For major trauma, there was a much larger body of research and as it was not feasible to read everything, meta-analyses and systematic reviews were used where possible, and the largest and most robust individual studies were selected. Both quantitative and qualitative papers were included, although there were remarkably few of the latter.

I conducted secondary searches beyond these key terms, searching for particular authors who had published widely in the field; for psychological concepts I wished to explore in greater detail; or where supporting information was needed, for example on the socio-economic or ethnic composition of London. Due to the limited research on appearance concern among trauma patients,

the general literature on appearance concern was consulted, and a few key reports and reviews helped identify the most relevant papers in similar populations.

Primary searches were conducted through PubMed, which remains a stronger source for more thorough literature searches (Bramer, Giustini, Kramer, & Anderson, 2013). Secondary searches were conducted in Google Scholar to make use of the 'cited by' function, to search for subsequent citations of the most relevant articles. In addition, a colleague conducting a systematic review of psychological outcomes following violence provided access to her selection of papers (A. Gomez-Carrillo, personal communication).

1.1 Introduction to key concepts

Traumatic injury

Major trauma is defined as injury with potentially serious outcomes, such as loss of limb, disability or death. It often involves multiple injuries. In 1988, the Royal College of Surgeons identified deficiencies in trauma care: as a result it was made a public health priority (Alexandrescu, O'Brien, & Lecky, 2009). Data collection consequently focussed more on physical outcomes related to mortality, disability and standards of care, and less on psychological outcomes or quality of life. The Trauma Audit and Research Network (TARN) is a trauma registry formed in response to the 1988 findings (NCEPOD, 2007) that collects data on physical outcomes. In 2010, it reported that standards of care in England still varied considerably; care lacked coordination; the availability of rehabilitation varied; and outcomes and costs were not recorded uniformly or widely. The same National Audit Office report found that improvements since 1998 have been slow and in-hospital mortality rates were higher in England than the US by 20% (Morse, Fisher, & Ross, 2010).

Despite these problems in trauma care in England, some clear patterns have emerged. Injury is the most common cause of death in Britain for people aged under 40, and for each death many more people are left with permanent impairment (Alexandrescu et al., 2009). The National Audit Office report into trauma care estimated that there are over 20,000 cases of major trauma per year in England, 5,400 of which result in death. A further 28,000 cases are treated in the same way as major trauma despite not meeting the precise criteria. Seventy five per cent (75%) of major trauma patients are male, and those aged 16 to 25 are at the highest risk (Morse et al., 2010). These patterns are repeated across Europe, with higher injury incidence rates for men and younger age groups (Alexandrescu et al., 2009). The causes of major trauma were recorded by the NCEPOD report (National Confidential Enquiry into Patient Outcome and Death); nationally, road traffic collisions (RTCs) accounted for over half of cases, whether as a driver or passenger (40.6%) or as a

pedestrian (15.7%) while 9.2% were injured in an assault (NCEPOD, 2007). A review of studies across Europe found RTCs and falls to be the most common causes of injury (Alexandrescu et al., 2009). The review did not report a clear association between injury incidence and socio-economic deprivation, but noted that there was a lack of robust studies in this area.

Major trauma in the UK is defined retrospectively by TARN after patient data have been submitted and analysed. Patients may have serious injuries and be treated by the major trauma team but still not meet the precise criteria. Patients are typically seen by a number of specialists in addition to trauma surgeons, such as orthopaedic surgeons, neurosurgeons and oral and maxillofacial surgeons (OMFS), as well as allied health professionals including occupational therapists, physiotherapists, and speech and language therapists. This thesis includes all patients treated by major trauma teams, whether or not they eventually met criteria.

Facial injury

Traumatic injuries to the head, face and neck are treated by the medical specialty of oral and maxillofacial surgery (OMFS). OMFS surgeons train in both dentistry and medicine and thus have particular expertise treating facial injury. Injuries range from skin cuts and loosened teeth, to highly complex damage, which may involve specialised tissues such as nerves or the exposed brain (BAOMS, 2012). Furthermore, facial injuries can be life-threatening if they involve airway obstruction or severe haemorrhage (Hutchison & Magennis, 1998). It is estimated that 500,000 suffer facial trauma each year (Sen, Ross, & Rogers, 2001) in Britain.

Two UK studies of facial trauma provided particularly robust epidemiological data: a nation-wide UK prospective study recorded all patients treated over one weekend (Hutchison & Magennis, 1998)(*N* = 6,114), and a retrospective study of all Scottish patients treated over five years (Conway et al., 2010)(*N* = 82,461). Prospective studies from New Zealand (Lee, 2009) (*N* = 2,581), America (Allareddy, Allareddy, & Nalliah, 2011) (*N* = 407,167) and the Netherlands (van Hout, Van Cann, Abbink, & Koole, 2013) (*N* = 364), confirm many of the UK findings.

Facial injury disproportionally affects certain demographic groups. All the studies reported that men were more likely to receive facial injuries. Men accounted for 68% of facial injuries in the UK study, while the Scottish study found that the incidence among men (4.68 per 1,000 population) was more than double that of women (2.00 per 1,000); the gap was still wider for alcohol-related injuries. Facial fractures are particularly common in young people: 61% of UK facial fracture patients were aged 15 to 25. Alcohol is often involved: the UK-wide study found alcohol to be involved in 22% of all cases (Hutchison & Magennis, 1998). In both Scotland and the US, socio-economically deprived

young men were disproportionally affected by alcohol-related facial injuries. Violent facial injury appears particularly likely to affect ethnic minority groups, including indigenous populations in Australia and New Zealand, and African-Americans and Hispanic groups in the US. However, there are limited epidemiological data on ethnic differences, and none from the UK.

Trauma caused by interpersonal violence

According to the World Health Organisation (WHO), violence is the leading cause of death and injury worldwide, although its true extent is often hidden. The WHO defines violence as "the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation" (Krug, Mercy, Dahlberg, & Zwi, 2002, p. 5). In this thesis, the definition is limited to actual physical incidents of interpersonal violence.

Alcohol is often implicated in interpersonal violence, and although the relationship between the two varies, there are strong links between alcohol and violence across all cultures (WHO, 2006). Population studies indicate hazardous drinking to be associated with over half (56%) of all violent incidents (Coid et al., 2006). Violent behaviour is in turn associated with alcohol and drug dependence, as well as anti-social personality disorder (Coid et al., 2006).

The face is often targeted in interpersonal violence: in a British study of assault victims attending hospital, the face was the most common site of injury, accounting for 83% of all fractures, 66% of lacerations and 53% of haematomas (Shepherd, Shapland, Pearce, & Scully, 1990). As a result, OMFS has been called the "lead specialty for those injured in violence" (Warburton & Shepherd, 2002, p. 657). A UK survey found 24% of facial injuries were caused by assault, and the rate was higher in metropolitan hospitals (26%) than county town hospitals (21%) (Hutchison & Magennis, 1998). In Scotland, facial injuries were most often a result of interpersonal violence (Conway et al., 2010). This pattern was repeated elsewhere: 37% of facial injuries in the US were caused by assault (Allareddy et al., 2011), 44% in New Zealand (Lee, 2009), 28% in Brazil (Carvalho & Cancian, 2010) and 40% in Turkey (Arslan et al., 2014).

Associations between alcohol consumption, violence and facial injury are common, and violence experts have called on OMFS as a discipline to engage with multi-agency interventions (Warburton & Shepherd, 2002).

Post-traumatic stress and acute stress disorder

PTSD was introduced into the Diagnostic and Statistical Manual of Mental Disorders (DSM) in 1980, although it is believed to have existed throughout human history and previously had other labels including shell shock and combat exhaustion (Abdul-Hamid & Hughes, 2014). Originally classified as an anxiety disorder, it is now considered a trauma- and stressor-related disorder in DSM-5 (American Psychiatric Association, 2013). It is unusual among psychiatric diagnoses in that criteria for diagnosis require occurrence of an external stressor: a traumatic event. PTSD diagnosis initially described exposure to events beyond 'normal' human experience, but successive editions of the DSM have broadened the criteria. A person must be exposed to, or witness, death, serious injury or sexual violence, or a serious threat of these. Indirect exposure, such as learning that a relative experienced a serious event, also qualifies as a criterion, as does repeated exposure to aversive details of the events.

PTSD research is a relatively new field, especially with regard to civilians exposed to traumatic events. Prevalence in the general population is hard to establish, but it is believed that at most 8% of Americans will suffer PTSD in their lifetime (Breslau, 2009). Estimates in Europe are lower. A study of an urban community sample in London recently reported the prevalence of PTSD symptoms as 5.5%, compared with a prevalence among all English adults of 3% (Frissa, Hatch, Gazard, Fear, & Hotopf, 2013). The same study noted that there is a need to explore the relationship traumatic events and subsequent development of PTSD, as it is not fully understood.

Symptoms are described in four clusters. Re-experiencing or intrusive recollection includes repeated, disturbing memories, dreams or flashbacks. Avoidant or numbing symptoms include avoiding stimuli – including places, people and behaviours – that may lead to disturbing memories or re-experiencing. Negative cognitions and mood include feelings of alienation, inability to recall key peritraumatic events, persistent negative beliefs about oneself or the world, and distorted feelings of blame. Finally, hyperarousal and reactivity cover changes in hypervigilance, exaggerated startle response, sleep disturbance, concentration problems, and irritable or reckless behaviour. The recently released DSM-5 (American Psychiatric Association, 2013) includes a PTSD dissociative subtype in which people experience prominent dissociative symptoms in addition to PTSD. These dissociative symptoms include feeling detachment from one's body or mind, and feeling that the world is dreamlike or unreal.

A person cannot receive a diagnosis of PTSD until symptoms have been present for at least one month. Acute stress disorder (ASD) was introduced to the DSM-IV in 1994 specifically to address two aims. Firstly, it aims to recognise acute reactions to traumatic events, though some degree of acute

reaction is considered normal and there may be criticisms if normal responses are 'pathologised' (Bryant, 2011). Interestingly, Bryant suggests part of the impetus was to enable trauma survivors to get medical or emotional support in the short term, and in particular, to access health insurance, whose policies often require a formal diagnosis. Secondly, ASD attempts to predict PTSD in the longer term. The symptoms delineated for ASD and PTSD are very similar. The difference is that specific symptom clusters do not need to be present for ASD diagnosis, whereas PTSD requires symptoms in each of the four clusters. ASD places more emphasis on dissociative symptoms: it has additional symptoms describing these reactions, and diagnosis requires three dissociative symptoms to be present. Studies suggest that the presence of dissociative symptoms in the acute phase is associated with a greater risk of PTSD (Bryant, 2011).

Depressive and anxiety symptoms

Depression is an episodic syndromal disorder characterised by depressed mood or loss of interest or pleasure. Depressive symptoms are common and although they are an indicator of psychological distress, only a minority of people will experience symptoms that reach the severity of a major depressive episode (MDE). A diagnosis of MDE requires five or more relevant symptoms to have been present for at least two weeks, including depressed mood or loss of interest or pleasure. The other symptoms characterised in the DSM (American Psychiatric Association, 2013) are; disruption to normal weight or appetite, sleep, psychomotor activity, concentration or decisiveness, as well as fatigue and recurrent feelings of worthlessness, guilt or thoughts of death.

Lifetime risk for depressive disorders is estimated at 15%, with prevalence at any time at 5%, although the female: male ratio is 2:1 (Plomin, DeFries, McClearn, & McGuffin, 2008). Amongst women, symptoms are particularly associated with anxiety symptoms and somatic or physical symptoms. Depressive symptoms can have a different presentation in different populations. For example, Asian and African cultures may present with more physical symptoms (Burton, 2011).

Depressive symptoms have biological correlates including high levels of cortisol secretion and inflammation. Depression has an important genetic component, and although specific genetic markers have yet to be identified, parental depression can affect children's mood by both environmental and genetic pathways (Silberg, Maes, & Eaves, 2010). Environmental factors can increase vulnerability, especially stressors early in life such as loss of a parent, sexual abuse or neglect (Kendler, Gardner, & Prescott, 2002; Widom, DuMont, & Czaja, 2007). Depressive episodes are often triggered by stress in individuals vulnerable to the effects of stress.

A diverse range of disorders is classified within anxiety disorders, including adjustment, panic, phobic anxiety and obsessive-compulsive disorders, and they are the most common form of mental illness. This study, like most research, focuses on symptoms relating to generalised anxiety disorder, which is characterised as an enduring but fluctuating sense of anxiety (Burton, 2011). Symptoms are free-floating, meaning they are not triggered by particular situations, nor do they occur in acute episodes like panic disorder. The core symptom is a sense of dread that is out of proportion to the likely reality. It can also include irritability, restlessness, sleep disturbance and problems with concentration: many of the symptoms coincide with those of depression. Anxiety has a moderate genetic component (Plomin et al., 2008), is more common in women, and, among women, the same genetic factors are believed to influence vulnerability to both depressive disorder and generalised anxiety disorder (Kendler, 1992, 1996).

Acute stress, PTSD, depression and anxiety are all episodic disorders, characterised by periods of clinically significant symptoms. Diagnosis depends on assessment either by a clinician or with a recognised diagnostic interview such as the Schedules for Clinical Assessment in Neuropsychiatry, or SCAN (Wing et al., 1990). When this gold standard of diagnosis is not feasible, researchers use validated self-report questionnaires to assess symptoms. High levels of reported symptoms give an indication of which participants would be most likely to meet criteria for a diagnosis. In this study, like most of the literature, I use recognised thresholds to identify individuals whose symptoms would be likely to meet the criteria for diagnosis.

Appearance concern

Worries about appearance are a potential source of psychological distress, though researchers have only recently focussed on this. Appearance and beliefs around appearance were only sporadically studied during most of the 20th century. Rumsey, one of the key researchers in the field, writes that many saw the subject as frivolous and found it distasteful to view appearance as being important (Rumsey, 2008). However, from the 1990's onwards, health psychologists began to recognise the importance of body image in self-perception. More recently, high levels of appearance concern have been associated both with a range of deleterious health behaviours such as smoking and lack of exercise, and with psychological distress (Rumsey, 2008); these findings clarify the important role it can play.

Appearance concern affects many individuals whose appearance conforms to society's physical norms, but for people living with disfigurement or visible difference – whether from birth or acquired – the issues may be even greater. The field remains relatively small, but the importance of appearance issues is recognised ever more widely.

Having introduced key concepts, the following section reviews the relevant research in detail.

1.2 The psychological impact of major trauma

Interest in the psychological impact of trauma has grown considerably in the past ten to 15 years. Much research in the UK has focussed on physical outcomes, and with good reason, given the shortcomings highlighted in the 1980s, discussed above. The National Audit Office report (Morse et al., 2010) notes the lack of uniform measures of the social and psychological impact of major trauma on patients in England. The national NCEPOD report fails to mention psychological, psychiatric or emotional outcomes, revealing a blind spot in the research approach.

However, there have been numerous studies of psychological distress, with a particular focus on post-traumatic stress symptoms (PTSS) and its risk factors. There has been less research on depressive and anxiety symptoms, and other outcomes. It is notable in studies worldwide that prevalence of distress varies a great deal between studies. This may be partly because the population varies from study to study. Some research has focussed on specific populations, such as urban groups, particular ethnic groups, and people injured in specific contexts, such as civilian or combat settings. Relevant studies are reviewed here to build a picture of the prevalence of distress. However, there has been relatively little research in the UK. Finally, few studies have examined appearance-related aspects, or the psychological impact of injuries that include a facial component.

1.2.1 PTSS following major trauma

The prevalence of PTSS following trauma is high, although there is a great deal of variation in the estimated prevalence rates of PTSS. One review reported rates between one and six months post-injury ranging from 17.5% to as high as 42%; the range was greater still at 12 months (O'Donnell, Creamer, Bryant, Schnyder, & Shalev, 2003). A large prospective study of people hospitalised following physical trauma found 31% met criteria for PTSD at six months and 28% at 12 months (Shih & Schell, 2010). A nationwide US study found 23% of injury survivors had symptoms indicative of PTSD diagnosis at 12 months (Zatzick et al., 2007). The variation in prevalence is likely to be caused by the diverse samples in different studies, in terms of location and demographic profile. Eligibility criteria can also differ in terms of mechanism, site and severity of injury, making direct comparisons difficult.

Most longitudinal studies find that PTSS prevalence following injury falls over time (O'Donnell et al., 2003; Zatzick & Kang, 2002). For example, a large Dutch study reported 30% of hospitalised patients experiencing PTSS up to three months post-injury, decreasing to 6% after 12 months (Haagsma et al., 2011). Interestingly, though, it has been reported that there was no significant difference between

baseline and follow-up distress in victims of violence (Johansen, Wahl, Eilertsen, Hanestad, & Weisaeth, 2006), including among victims with sub-clinical symptoms of distress.

PTSD symptoms have been reported to vary in severity according to the mechanism of injury (Kelley, 2009). Those who experienced interpersonal violence are at greater risk than those who experience non-violent injuries, such as road traffic accidents or natural disasters (Lim, Adams, & Lilly, 2012; Shih & Schell, 2010). In a large prospective study of injured patients attending follow-up trauma appointments, the highest incidence of PTSD was among those injured in sustained assaults, 43% of whom met the cut-off for PTSD diagnosis, compared with 25% overall (Alarcon et al., 2012). It has been hypothesised that worse outcomes after assault relate to the perception of control: those injured in accidents are better able to take preventive measures to avoid further accidents in future (such as wearing seatbelts), whereas those who have been assaulted may feel helpless (Alarcon et al., 2012).

However, certain demographic groups are more likely to experience violence, making it difficult to untangle the effects. For example, violence is more common among socio-economically deprived groups. Among traumatic brain injury (TBI) patients, those injured through violence were significantly younger and more likely to be single, male and of ethnic minority status, and to have evidence of previous alcohol misuse in their medical records (Gerhart, Mellick, & Weintraub, 2003). The factors that make people more susceptible to violent injury overlap with those that make them vulnerable to psychological distress. However, there are also differences in the nature of injury. It has been suggested that violent injuries are more focal and localised and therefore less severe than accidental injuries: violently injured TBI patients typically had a higher Glasgow Coma Score (GCS) on contact with emergency services (Harrison-Felix et al., 1998). However, this has not been reported elsewhere, indeed, Alarcon et al reported that assaultive injury was associated with greater symptom severity (Alarcon et al., 2012). Severity is likely to vary according to context, for example, gang violence can use guns, or cars-as-weapons, which cause severe injuries.

Alcohol has been assumed to be a causal factor in violent incidents, but in fact, both alcohol consumption and assault can be consequences of other factors. For example young men in the UK were shown to gravitate towards city centres when pubs or bars closed, regardless of what time this happens (Shepherd & Brickley, 1996); interventions to stagger closing times reduced violent injury rates.

Rates of psychological morbidity are typically lower among those injured in accidents but the sequelae can still be distressing, and can have a complex pathway. Among 52 patients being treated

for major trauma following road traffic accidents, those who developed PTSD had higher rates of depressive symptoms and a reduction in health-related quality of life (Baranyi et al., 2010). PTSD prevalence was high in this relatively small sample, with 39% meeting diagnostic criteria at six weeks, and 25% at one year. A large prospective study of people injured in road traffic accidents found lower rates, with 17% experiencing PTSS at one year (Ehlers, Mayou, & Bryant, 1998). A Swiss study found lower rates still, with 2% of accidental trauma patients experiencing PTSS at one year (Schnyder, Moergeli, Trentz, Klaghofer, & Buddeberg, 2001). Despite variation in prevalence, PTSS is generally lower after accidental injury.

1.2.1.1 The role of acute stress disorder

Part of the role of ASD is its usefulness in predicting PTSD, and early studies of trauma patients suggested it achieved this. Eighty per cent (80%) of trauma patients who met criteria for ASD subsequently met criteria for PTSD six months after the event (Brewin, Andrews, Rose, & Kirk, 1999; Bryant & Harvey, 1998). Several studies have shown the diagnosis to be useful in identifying early symptoms which develop into PTSS (Bryant & Harvey, 2003; Forbes et al., 2012; Marshall, Spitzer, & Liebowitz, 1999). However there is uncertainty over the ability of ASD to predict PTSD and some suggest that focussing on particular symptom clusters may be as effective (Brewin et al., 1999). A recent systematic review of 22 papers found somewhat poorer predictive power (Bryant, 2011). The study summarised the specificity, sensitivity and positive and negative predictive power of ASD as a screen for PTSD. Of 22 studies included, ten dealt with adult populations relevant to this study, and these are reproduced in Table 2. Papers published since Bryant's review did not include comparable data and so are not included.

Table 2: Summary of prospective studies of the relationship between ASD and PTSD (Reproduced from Bryant's 2011 review, excluding studies from non-relevant populations)

Study	Trauma	N	Follow up N	Follow-up duration (months)	ASD %	PTSD %	Sensitivity	Specificity	Positive predictive power	Negative predictive power
Harvey and Bryant, 1998	Motor vehicle accident	92	71	6	13	25	0.39	0.96	0.78	0.85
Brewin et al, 1999	Assault	157	138	6	19	20	0.57	0.89	0.57	0.89
Holeva et al, 2001	Motor vehicle accident	434	265	6	21	23	0.59	0.93	0.72	0.88
Fuglsang et al, 2004	Motor vehicle accident	122	90	6 to 8	28	17	0.47	0.76	0.28	0.88
Harvey and Bryant, 1999	Motor vehicle accident	92	56	24	13	25	0.29	0.92	0.62	0.75
Elklit and Brink, 2004	Assault	214	114	6	24	22	0.44	0.88	0.5	0.85
Hamanaka et al, 2006	Motor vehicle accident	100	100	6	9	9	0.43	0.94	0.33	0.96
Bryant et al, 2008	Injury	597	507	3	7	10	0.31	0.96	0.46	0.93
Murray et al, 2002	Motor vehicle accident	146	128	6	10	24	0.34	0.97	0.77	0.83
Kuhn et al, 2006	Injury	58	52	6	7	6	0.33	0.92	0.25	0.96

The review showed that the predictive ability of ASD varied considerably. Across the studies, positive predictive power was reasonable, suggesting that individuals with ASD are at higher risk of PTSD. However, sensitivity was poor: the majority of individuals who did develop PTSD had not been identified by ASD criteria. This suggests ASD has modest accuracy at best in identifying PTSD. None the less, and in the wake of considerable debate, ASD was retained in the most recent update of the DSM (American Psychiatric Association, 2013).

ASD is imperfect as a predictor of PTSD, but clinically it is the only recognised diagnosis for measuring acute responses to trauma. It has a valuable role in recognising and describing distressing symptoms, even if its accuracy in predicting long-term distress is variable, and this limitation is recognised.

1.2.2 Other psychological disorders following major trauma

There is robust evidence from clinical populations that people who develop significant PTSS have higher rates of other psychological disorders than the general population. These include depressive disorders and symptoms, anxiety disorders and symptoms other than PTSD, and substance misuse and phobias (Breslau, 2009; Burton, 2011; O'Donnell et al., 2003). Up to 85% of civilians diagnosed with PTSD experience at least one other psychiatric condition (O'Donnell et al., 2003). Among hospitalised trauma patients, significant symptoms of depression and PTSD have been reported to co-occur in 21% at six months post-injury, and in 19% at 12 months (Shih & Schell, 2010). High psychological comorbidity has also been observed in victims of violent trauma (Johansen et al., 2006). However, research into co-morbid conditions is limited, especially compared with the extensive literature on PTSS, and the lack of research into post-traumatic depression has been noted (O'Donnell, Creamer, et al., 2008; Steel, Dunlavy, Stillman, & Pape, 2011).

Several mechanisms have been proposed to explain this comorbidity, and causal patterns are hard to establish. One possibility is that prior psychological disorders increase the risk of PTSD by increasing the likelihood of people having chaotic lifestyles where exposure to traumatic incidents is more common (Breslau, Davis, Peterson, & Schultz, 2000). For example, people with alcohol or drug dependence are more likely to become involved in altercations. Breslau et al also reported that the risk factors for PTSD and major depressive disorder in this population did not appear to be separate, but instead overlapped.

Another possibility is that there is a vicious circle of disturbed mental health and traumatic events. Past work has shown that those hospitalised following injury are more likely than the general population to have experienced previous traumatic events (Zatzick & Kang, 2002). Previous

traumatic life events are known to increase the risk of mental health disorders, and there may be an element of recidivism in exposure to assault or alcohol-related accidents.

An episode of one disorder may make an individual more susceptible to other disorders. PTSD itself could increase the risk of secondary psychological disorders. For example, alcohol dependence may arise as a way to cope with PTSS (Breslau, 2009). People who develop PTSD after being exposed to trauma are significantly more likely to develop major depressive disorder in subsequent years (Breslau et al., 2000). Previous psychiatric history is associated with symptoms of psychological distress post-injury (Mason, Wardrope, Turpin, & Rowlands, 2002; Steel et al., 2011). Alternatively, there may be shared underlying susceptibilities including personality, childhood or genetic factors that predispose people to psychological disorders in general.

There has therefore been a tendency to focus on PTSS over depressive or anxiety symptoms, or to see PTSS as the main outcome, with depressive symptoms being a way of understanding PTSS (O'Donnell et al., 2003; Zatzick & Kang, 2002). However, independently of PTSS, rates of clinically significant depressive symptoms are high following trauma. Prevalence estimates have varied from as high as 60% at baseline (Holbrook, 1998), to 31% at six months (Holbrook, 1998; Shih & Schell, 2010), to much lower rates at one year (between 9% and 16%) (Bryant et al., 2010; Schnyder et al., 2001).

Symptoms of anxiety are rarely discussed, but a Norwegian cross-section of people injured in assaults reported that 44% had combined depressive and anxiety symptoms (Johansen et al., 2006). A large Australian study (N = 1,084) found the prevalence of disorders at one year using a psychiatric interview to be 16%, 11% and 10% for depression, generalised anxiety and PTSD respectively (Bryant et al., 2010).

1.2.3 Factors associated with psychological distress following major trauma

Traumatic events are common, yet PTSD and PTSS affect only a minority of those exposed. In the US, 80% of people have experienced traumatic events of sufficient magnitude to qualify as stressors in PTSD diagnosis, and yet fewer than 10% overall develop PTSD. Rates in Europe are usually lower. For example, rates of exposure to traumatic events have been reported as 20% and 28% in Germany and Switzerland respectively, with the prevalence of PTSD consequently lower too, 1.3% to 1.4% (Breslau, 2009). In England, 42% of adults are reported to have been exposed, with 3% screening positive for current PTSS. However, an area of South East London had higher estimates: 78% of residents had been exposed to at least one lifetime trauma, and 5.5% of the community sample had current PTSS (Frissa et al., 2013).

If only a minority of individuals are vulnerable to developing PTSS, clinicians would benefit from being able to identify this group. Many socio-economic and biographic factors have been implicated in increased susceptibility. A meta-analysis showed that past mental health disorders, mental health disorders in family members, and adversity in early life increased the risk of PTSS consistently across diverse populations, including trauma-exposed civilians (Brewin, Andrews, & Valentine, 2000). It is widely acknowledged that women are at greater risk than men of developing PTSS, as they are to all stress-related disorders. This has been reported following traumatic incidents, including motor vehicle accidents (Baranyi et al., 2010; Brewin et al., 2000; Bryant & Harvey, 2003) and violent assaults (Breslau, 2009). However, the evidence is somewhat mixed, and Brewin's meta-analysis reported that effects of gender disappeared completely in some trauma samples (Brewin et al., 2000).

Ethnicity has been shown to be associated with PTSS outcomes, but has frequently been analysed dichotomously, i.e. as white majority groups versus non-white or minority groups. This is necessary when sample sizes are small for minorities, but it is an over-simplification and can obscure important differences (Hatch et al., 2011). Non-white minority groups appear to be more susceptible to PTSS (Alarcon et al., 2012; Zatzick, Jurkovich, et al., 2004) but the associations are often weak, and in any case such generalised findings have limited value, as is frequently acknowledged in the literature (Brewin et al., 2000; Stephens et al., 2010).

Some larger studies have analysed ethnicity in more meaningful groups, however. In the US, research found Hispanic trauma survivors reported more severe PTSS than non-Hispanic Caucasians, and were also more likely to endorse symptoms related to sensory perceptions such as hypervigilance and flashbacks (Marshall, Schell, & Miles, 2009). Another large study found that both American Indian and African American patients experienced a higher prevalence of PTSS than other ethnic groups, and had also experienced more traumatic lifetime events prior to injury (Stephens et al., 2010). However, findings about one specific ethnic group cannot be meaningfully applied to other ethnic groups, and there remain gaps in the understanding of cultural differences in post-traumatic reactions. An obvious barrier to such research is the large sample sizes needed to allow valid analysis of subgroups.

Severity of injury does not generally predict the severity of psychological sequelae when assessed using standard measures such as the Injury Severity Score (ISS) or Abbreviated Injury Scale (AIS) (Alarcon et al., 2012; Baker, O'Neill, Haddon, & Long, 1974; Mason et al., 2002; O'Donnell et al., 2003). However, patients' subjective ratings of the severity of their own injuries have been shown to have better predictive power for PTSS (Gabert-Quillen, Fallon, & Delahanty, 2011). In the same

study, objective and subjective severity scores were not related. Other injury-related factors have a greater impact. For example, people who believe that they may die have been reported to have significantly worse psychological outcomes (Holbrook, Hoyt, Stein, & Sieber, 2001; Kenardy, Heron-Delaney, Warren, & Brown, 2014). The presence of mild TBI has been shown to lead to a doubling in the risk of PTSD, panic disorder, agoraphobia and social phobia (Bryant et al., 2010). In motor vehicle accident survivors, acute stress reactions have been shown to be a more accurate predictor of PTSD in women than in men (Bryant & Harvey, 2003). Acute trauma reactions predict later PTSD outcomes to an extent, although, as discussed above, there is inconsistency in the research (Bryant, Friedman, Spiegel, Ursano, & Strain, 2010).

Susceptibility to PTSS has been linked to certain cognitive styles and personality types. Avoidant coping styles were implicated in higher rates of psychological distress in a meta-analysis of studies of interpersonal violence and severe injury (Littleton, Horsley, John, & Nelson, 2007). Avoidant coping is characterised by efforts to avoid reminders of stressors, including particular places and people. Avoidant approaches are difficult to assess in study participants who have not left hospital and therefore been exposed to stressor situations yet. There is also an evident overlap between avoidant coping and avoidant symptoms of PTSD, and one might question how useful it is to assess the coping style when PTSS might be present. Meanwhile, anxiety sensitivity refers to a fear of anxiety and related sensations and this predicted subsequent severity of PTSS (Marshall, Miles, & Stewart, 2010). Individuals with anxiety sensitivity may be more sensitised to the effects of trauma, in that even small reminders can trigger post-traumatic responses and PTSS. Self-blame has been associated with better psychological outcomes in a sample of TBI patients (Hart, Bogner, Whyte, & Polansky, 2003). Those injured through interpersonal violence were significantly more likely to blame others, as one would expect.

1.2.4 Major trauma summary

PTSD and PTSS are clearly common in injured populations, although estimates of prevalence vary considerably across different populations, as do risk factors (Brewin et al., 2000). For this reason, there is value in studies of specific populations. Findings vary in different countries, highlighting a need for more UK-specific research, of which there has been little to date. This is particularly true in the case of ethnic differences, although filling such gaps requires large studies. Violent injury has a role in predicting PTSS, but there is limited evidence on its effect on other psychological outcomes. PTSS is frequently comorbid with symptoms of depression and anxiety, and few studies have focussed on comorbid symptoms. Interestingly, no studies were found which examined appearance concerns following major trauma, although appearance can be altered in the short and long term following injury.

1.3 The psychological impact of facial trauma

The issues faced after OMFS trauma are broadly similar to those following major trauma, with similar negative emotional outcomes. None the less, there are distinct treatments and outcomes. For example, facial trauma patients may have more visible injuries and scars than major trauma injury patients. However, research has mostly been conducted within one medical specialty, i.e. either major trauma or facial trauma. I found no studies comparing psychological outcomes for these two groups.

Research into the psychological sequelae associated with facial injury is relatively limited. There has been an increase in research in the past decade, and this literature review draws on the small pool of studies available. Among some 20 articles identified, several were discussion papers. Sixteen (16) articles reported on 11 different studies. Most of these studies had modest samples: just four analysed more than 100 participants. All the known research is reviewed in this section, looking first at studies dealing with PTSS, then those examining other psychological disorders.

1.3.1 PTSS following facial trauma

PTSS has been relatively widely studied among patients with facial injury. As in major trauma, the estimates of prevalence vary widely, and tend to be higher in the acute phase. The estimated prevalence of patients with significant PTSS can be high, with estimates as high as 41% at four to six weeks (Hull et al., 2003). However, prevalence was lower in other studies, especially those taking measurements at later time points. Studies have reported 25% at one month (Glynn et al., 2003), 27% at seven weeks (Bisson, Shepherd, & Dhutia, 1997), 17% at ten weeks (Ukpong, Ugboko, Ndukwe, & Gbolahan, 2007), and 23% at one year (Glynn et al., 2007). As we would expect, PTSS scores at one month predict scores at one year (Glynn et al., 2007; Lui & Glynn, 2009). Although the prevalence of distress usually decreases over time, it has been reported that it remains high among people who were assaulted (Shepherd, Qureshi, Preston, & Levers, 1990).

The wide range of measures used probably accounts for some of the variability in reported prevalence of PTSS. In comparison, the Hospital Anxiety and Depression Scale (HADS) has been frequently used in the few studies assessing depressive and anxiety symptoms.

1.3.2 Other psychological disorders following facial trauma

The reported prevalence of clinically significant depressive symptoms varies considerably, with some studies reporting a prevalence that was similar to or lower than the general population. In the UK, estimates have been as low as 5% of facial trauma patients at seven weeks post-injury (Bisson et al., 1997) and 8% at four to six weeks (Hull et al., 2003). However, others have found higher prevalences of depressive symptoms: Sen et al reported a 30% prevalence at one year (Sen et al., 2001); Islam et

al reported that 28% experienced clinically significant symptoms (Islam, Ahmed, Walton, Dinan, & Hoffman, 2010) four weeks post-injury, in a UK sample. Furthermore, they used a cut-off of ≥12 on the HADS subscales, compared with cut-offs of ≥8 in the studies by Bisson et al, Hull et al and Sen et al. The approach of Islam and colleagues was also unusual in collecting data on depressive and anxiety symptoms but not on PTSS. In one study, again using the HADS with a cut-off of ≥8, estimates were as high as 47% at six to eight weeks (Ukpong et al., 2007), although this decreased to 22% at ten to 12 weeks, and its Nigerian sample may have fewer parallels with UK research. The variability across studies may be explained by small sample sizes; there were 50 or fewer participants in each study cited.

Anxiety symptoms have been reported in a few studies of facial injury patients, although prevalence varies. Clinically significant anxiety symptoms have been shown to be present in 13% to 14% (Bisson et al., 1997; Ukpong et al., 2007), and as high as 46% (Hull et al., 2003). Again, small sample sizes and different countries may account for the variation.

It is unclear, and a gap in existing research, what role a past history of mental ill health plays in psychological outcomes in this group. A retrospective study of pre-existing psychological comorbidity in 300 OMFS patients found only 16 cases of recorded psychiatric contact, consisting of substance abuse, mood disorders and schizophrenia (Hoffman & Islam, 2012). Another retrospective study found no referrals for psychiatric help in a sample of 47 facial trauma patients (Bisson et al., 1997). A French study suggested, in its English abstract, that depression and substance abuse are themselves risk factors for facial trauma (Foletti et al., 2014).

Alcohol misuse has been reported to be high among facial trauma patients. Thirty six per cent (36%) had scores on the AUDIT (Alcohol Use Disorders Identification Test) that corresponded to hazardous or harmful alcohol consumption and possible dependence on alcohol (Auerbach et al., 2008). Substance misuse prior to injury is also common (Islam, Hooi, & Hoffman, 2009).

1.3.3 Factors associated with psychological distress following facial trauma

Unsurprisingly, the factors associated with distress following facial trauma are similar to those in major trauma. There is some evidence that psychological outcomes are worse among those whose facial injuries were sustained by violent means, although it is limited. Firstly, a study of 122 facial trauma patients reported that anxiety and depressive symptoms were significantly higher among assaulted patients than accident victims three months post-injury (Shepherd, Qureshi, et al., 1990). However, the brief article reports two different measures of depressive symptoms with markedly different estimations of the prevalence of significant symptoms (8% versus 59% among assault patients at three months); only one measure revealed significant differences by mechanism.

Secondly, a study of 43 participants reported significant associations between mechanism of injury and scores for PTSS, depressive and anxiety symptoms, with worse outcomes for those injured violently (Bisson et al., 1997). Finally, an American study explored barriers to psychological care for facial trauma patients. The authors only recruited patients experiencing symptoms indicative of PTSS, depression or alcohol misuse *and* injured through violence: in this restricted sample, they found that 34% of the 62 patients experienced significant PTSS at one month (Wong et al., 2007). These studies have limitations, including the modest sample sizes of the latter two, and I found no other strong evidence of the psychological effects of violence in facial injury patients.

Two small studies have reported that injury severity was not associated with the severity of psychological sequelae in this population. One used the ISS and reported no differences in the prevalence of acute post-traumatic stress in a sample of 47 OMFS patients (Auerbach et al., 2008). The other found no psychological differences between with patients with less severe injuries (lacerations that typically only require suturing) and those with more severe injuries (closed bone fractures that are usually treated surgically)(Bisson et al., 1997). Both studies had limitations but none the less reflected the pattern seen in major trauma.

The publications from a substantial study (N = 336) have reported that social support protects against PTSS. In the study's sample group of socio-economically disadvantaged adults, perceived social support was related to lower rates of PTSD symptoms, and unmet social support needs were associated with poorer psychological outcomes (Glynn et al., 2003; Lento et al., 2004; Lui & Glynn, 2009). However, social support networks can alter when psychological sequelae develop, particularly if individuals have symptoms of avoidance or emotional numbing that isolate them from partners, friends and family. An individual's perception of their social support can also be affected, even if there are no real changes in support.

A review paper comments on the considerable pre-existing resource needs of people with facial injuries, in relation to financial instability, social support needs and ethnic minority status (Gironda & Lui, 2010). Facial trauma patients have been reported to have higher pre-trauma levels of unemployment, alcohol misuse and relationship difficulties than the general population (Levine, Degutis, Pruzinsky, Shin, & Persing, 2005). Pre-trauma psychological disorders have been reported to be common in some studies (Hoffman & Islam, 2012; Islam et al., 2009), although there are inherent difficulties in establishing this post-trauma (Bisson et al., 1997).

A range of other factors has been associated with PTSS in this population. Among socio-economically disadvantaged patients, poor psychological outcomes one month post-injury were associated with;

older age, being female, a history of psychological distress, current use of mental health services, social service use, prior lifetime trauma, traumatic life events in the past year, pain as a consequence of the injury and psychological distress at the time of discharge (Glynn et al., 2003). However, fewer factors predicted poor outcomes at one year for the same cohort: these were prior psychological distress, social service use, prior lifetime trauma, traumatic life events in the past year and a paucity of coping resources in initial days (Glynn et al., 2007). This reduced list is likely to reflect the factors linked to chronic rather than acute distress. Two further studies have reported an increased risk among women (Hull et al., 2003; Nwashindi, Dim, & Saheeb, 2014). Surgeons' predictions of psychological distress have been associated with patients' psychological outcomes (Bisson et al., 1997), suggesting that simple, unstructured means of identifying risk can have value.

There is limited evidence of increased risk among ethnic minority groups, despite the fact this is a common association in major trauma. A number of American studies have focussed on deprived urban populations, presumably due to the American healthcare system, where public hospitals serve deprived populations rather than wealthier patients with access to private healthcare. These studies had a high proportion of ethnic minority participants, if not a majority, but did not report on ethnic differences (Glynn & Shetty, 2010; Glynn et al., 2007; Leathers, Le, Black, & McQuirter, 2003; Murphy et al., 2010).

The effects of different coping strategies on PTSS were reported in one study. The use of emotion-focussed coping strategies – those which attempt to change one's own emotional reaction – was associated with worse post-traumatic outcomes, particularly with avoidance and arousal symptoms (Auerbach et al., 2008). Coping styles were associated with the development of depressive symptoms, with those who blamed others scoring considerably higher on the HADS-D than those who blamed themselves (Islam, Cole, Walton, Dinan, & Hoffman, 2012). It is probable that avoidant coping styles would be associated with avoidant PTSS symptoms, although no papers examining this link were found.

Many of the studies discussed have speculated that facial injury carries an additional psychological burden due to the psychosocial role of the face (De Sousa, 2008; Gironda & Lui, 2010; Levine et al., 2005; Mendes & Figueiras, 2013). However, none appear to have evaluated this claim quantitatively, for example by comparison with a similar injury group.

1.3.4 Faces as social tools

There are practical reasons to research facial injuries specifically, as problems may be identified in facial trauma clinics by OMFS surgeons, and those specialists may be best placed to apply early interventions. However, the face is also an intensely social part of human anatomy. Anecdotally,

many people feel that faces are different from other parts of the body; closely tied to identity, both the canvas and mask with which humans interact with the world. A Portuguese review of acquired facial disfigurement takes the viewpoint (in its English language abstract) that people with facial difference "have lost their 'identity' due to trauma" (Mendes & Figueiras, 2013, p. 484). Theorising the role of faces, Pattison writes that faces are "not just private property but form a place of negotiation about self, identity, responsibility and belonging" (Pattison, 2013, p. 49). At an instinctive level, damage to the face seems worse than other kinds of injuries. The social role of the face is described in the extensive psychological research into face perception; that research is outlined here.

It is well established that the way humans perceive faces is different from the way they perceive other visual stimuli, including those of comparable complexity. Faces are recognised and processed in particular ways by the human brain. New-born babies show a preference to look at faces and face-like stimuli (Johnson, Dziurawiec, Ellis, & Morton, 1991; Mondloch et al., 1999). For example, even in the first half hour post-partum, infants will attend significantly longer to a pattern that resembles a face than to the same components arranged in a scrambled, non-face-like way. This preference occurs before infants have seen a real human face, suggesting that face processing is an innate, unlearned skill (Johnson et al., 1991). New-born infants also prefer human faces to non-human faces, while a preference for human bodies develops only some months after birth (Heron-Delaney, Wirth, & Pascalis, 2011). If the face is 'special' then visible changes to it are likely to carry additional importance.

Faces are processed more holistically than other stimuli: faces are processed as a 'gestalt' whole object, whereas most stimuli are understood in sequence and analysed in parts (Farah, Wilson, Drain, & Tanaka, 1998). While there is individual variation in what is seen as attractive, there is also a high level of agreement on attractiveness, both within cultures and across cultures. Facial changes are particularly noticeable, both to an individual when seeing their own image, and to observers (Little, Jones, & DeBruine, 2011). Faces that possess symmetry and averageness are widely perceived as the most attractive (Little et al., 2011). In experiments using manipulated photographs, faces with scars or congenital abnormalities were seen as significantly less honest, intelligent, trustworthy and employable than 'normal' faces, when rated by 210 study participants (Rankin & Borah, 2003). Such findings may be acutely relevant when the face is visibly changed by injury.

1.3.5 Facial trauma summary

There have been several studies examining the prevalence of significant PTSS in facial injury patients. However, as with major trauma research, they show wide variations in prevalence, and some have

been hampered by small sample sizes. There is a suggestion that the mechanism of injury affects psychological outcomes, but this has not been explored in detail, or in robustly sized studies. Good social support appears to act as a protective factor against PTSS. Depressive and anxiety symptoms have been given relatively little attention in the literature, and the prevalence of significant symptoms varies considerably. Again, this may be due to modest sample sizes. Several studies have looked at one psychological outcome, typically PTSS, without collecting data on others, such as depressive and anxiety symptoms. Alcohol misuse is common in facial trauma patients in the few studies that explore it. Given the high levels of psychological comorbidity seen in major trauma patients and in the few larger studies on facial injury patients, it is important to gather information on a range of psychological sequelae. Finally, faces are special in human perception. Changes to the face are hypothesised to have implications for a person's self-perception and for their social interactions, and there is a considerable and growing body of work on appearance concern.

1.4 Appearance concern in people with visible difference

It has been shown that having a visible disfigurement can affect an individual's psychological wellbeing, including their quality of life, self-esteem and the quality of their social interactions (Rumsey & Harcourt, 2004). Forty eight per cent (48%) of adults living with visible difference experience symptoms of anxiety (Rumsey, Clarke, White, Wyn-Williams, & Garlick, 2004). However, much research focuses on congenital differences, and to a lesser extent on coping with acquired diseases and burns. Some studies consider those with disfigurement as a heterogeneous group, regardless of the pathway to disfigurement. One difficulty with interpreting the existing research is that appearance concern is defined and measured in diverse ways.

Only a few studies have considered appearance concern in trauma patients, and have done so in a cursory way. In one study, facial trauma patients were more dissatisfied with their appearance when their overall injuries were more severe on the ISS, although the severity of their facial injuries specifically did not affect satisfaction with appearance (Auerbach et al., 2008). Another study found that facial trauma patients gave themselves lower attractiveness scores between six months and two years post-injury, compared with a control group recruited from the general population (Levine et al., 2005). However, distress about appearance was not explicitly measured. A discussion paper dealing with facial disfigurement in general found no clear relationship between distress about appearance and objective ratings of disfigurement (Bradbury, 2012). However, Bradbury noted that those with more severe disfigurement might find it easier to ask for help and to adopt coping strategies.

As there is almost no research about appearance following trauma, studies in other patient populations proved relevant and informed this project. Populations that had acquired disfigurement in adulthood, for example through disease or burns, were chosen as being most comparable.

It was noteworthy, although counterintuitive, that the severity of either disfigurement or injury failed to predict appearance concern (Rumsey & Harcourt, 2004). This reflects a pattern seen in major trauma and facial trauma, where injury severity shows little association with psychological sequelae. Subjective measures of severity, i.e. judgements made by patients themselves, often have more predictive power in identifying poorer adjustment (Brown, Moss, McGrouther, & Bayat, 2010; Levine et al., 2005; Moss, 2005).

Surgeons' appearance ratings can also have modest predictive power of patient distress (Moss, 2005). However, this finding is not universal. In patients attending a specialist skin clinic treating a range of different scars, objective and subjective ratings of severity were not associated (Brown et al., 2010). If clinicians' ratings do not agree with those of patients, another way of identifying patients at risk of appearance concern needs to be found (Bessell, Dures, Semple, & Jackson, 2012). There are exceptions in different populations: head and neck cancer patients' own ratings of their level of disfigurement, as well as those of their clinicians, were associated with the severity of patients' psychological distress (Hagedoorn & Molleman, 2006); patient and physician ratings were also correlated. Head and neck cancer surgery can be very invasive, however, and can result in more severe changes to appearance than is typically experienced by facial trauma patients. Caution needs to be exercised in applying these findings to different groups.

Facial disfigurements affecting the central triangle of the eyes and mouth are more immediately discernible than those occurring elsewhere in the face and therefore might be expected to cause more distress, according to a psychologist specialising in disfigurement (Bradbury, 2012). Disfigurement to this central triangle has been associated with more negative reactions from others, but did not affect psychological outcomes for individuals with disfigurement (Tebble, Thomas, & Price, 2004). And in skin scar patients, non-visible disfigurement caused more psychological distress (Brown et al., 2010). It was hypothesised that having very visible scars encourages people to seek help and to learn to cope sooner than if they were able to hide their scars. Similarly, people undergoing plastic surgery with moderate disfigurement were more likely to have difficulties with adjustment than those with either mild or severe disfigurement (Moss, 2005). The common finding that patients' own perceptions of severity are associated with psychological outcomes suggests that the perceived visibility of an injury needs to be assessed. The inconsistencies in the literature are

likely to reflect the fact that self-perceptions differ, both between individuals and between clinical populations. Therefore, there is value in understanding the experiences of different clinical groups.

1.4.1 Factors that contribute to greater appearance concern

Several factors have been implicated in higher appearance concern but there is limited consensus. Facial disfigurement is commonly believed to cause more psychological distress to women than men, and in Britain women receive higher compensation in court for facial injuries (Bradbury, 2012). In practice though, men can be just as distressed as women (Bradbury, 2012; Carr, Moss, & Harris, 2005; Rumsey & Harcourt, 2004; L. Shepherd, 2014). However, some studies have reported greater appearance concern among women (Rumsey et al., 2004; Thombs et al., 2008). In the general population, concerns about body image have been reported to lessen in middle age and later life, yet older people with minor visible differences can experience considerable distress about their appearance (Rumsey & Harcourt, 2004). In the heterogeneous sample of people awaiting plastic surgery described above, greater age was associated with a small but significant decrease in appearance concern (Carr et al., 2005).

Certain coping strategies have been shown to worsen outcomes: burn injury patients using both venting and mental disengagement were less satisfied with their appearance, and experienced greater distress (Fauerbach et al., 2002). Emotion-focussed coping strategies such as these appeared to increase the likelihood of poor psychological outcomes. Meanwhile, social support has been shown to mediate the distressing effects of disfigurement, but social support systems can themselves be damaged by the psychological disorders arising from disfigurement, for example if people become withdrawn or aggressive (Bradbury, 2012).

It might be expected that, following traumatic injuries, those with visible disfigurements would avoid reminders of their own appearance. For example, they might avoid social situations where the reactions of others remind them of physical changes, or physical reminders such as mirrors and reflections. There is some evidence that people with visible difference engage in this kind of avoidance. In patients with visible burns, PTSD symptoms of avoidance and arousal were reported to be particularly common, along with emotional numbing (Fukunishi, 2000).

1.4.2 Assessing appearance concern

Appearance concern is neither a psychiatric diagnosis nor a long-established psychological concept. Understanding of the concept is quite broad and sometimes ill defined, and there is limited consensus on what exactly is measured by the questionnaires in use. The terms in use include disfigurement, visible difference, appearance concern, appearance-related distress, body esteem, body attitudes and body image. Broadly speaking, body image refers to a person's concept of their

own appearance, and how they believe others to perceive it, whereas a visible difference or disfigurement describes appearance that differs from a perceived norm. While visible difference is of more immediate relevance here, such changes can, in turn, affect body image. Body image is recognised as being multi-factorial, affecting behaviours and cognitions as well as emotional states (Carr et al., 2005).

1.4.3 Summary of appearance concern research

The field of appearance research has had very little influence on traumatic injury research to date. None the less, patterns can be discerned from other populations. There is no clear relationship between severity of disfigurement and psychological sequelae. Patients' subjective ratings of their own appearance changes appear to be a stronger predictor of psychological distress, and these do not always correlate with the ratings of medical professionals. There is a perhaps counter-intuitive indication that patients with severe disfigurement have better psychological outcomes, but reasons for this have so far only been theorised. Findings from other populations have informed this literature review but there are obvious limitations to this. Issues are likely to be very different in trauma patients with acquired differences than in those with congenital differences who have had a lifetime to adjust to, or suffer from, their visible differences. Head and neck cancer patients' visible differences are acquired in the process of life-saving treatment. Burn injury patients may have the most similar mechanism of disfigurement but none the less can have had exposure to very different traumatic experiences, and different issues with treatment, recovery and scarring. The literature considered here therefore highlights the need for more thorough appearance research to be conducted in trauma patients.

1.5 Local context

Inner cities have long been recognised as having particular challenges related to deprivation, social inequality, and health inequalities, and the catchment area of the Royal London Hospital is no exception. The hospital is in Tower Hamlets and predominantly treats patients from East London. Hazards to health in urban areas include increased rates of crime and violence, poor standards of housing, and unemployment (Hatch et al., 2011). There have been numerous studies of London's uniquely diverse and sometimes highly deprived communities, and the SELCoH study proved especially useful (Frissa et al., 2013; Hatch et al., 2011, 2012). It established mental and physical health in a South East London community sample, and therefore provides localised information relevant to this study's population. There are important differences between East London and the SELCoH's Lambeth and Southwark populations, perhaps most importantly in terms of ethnicity: Lambeth and Southwark have a high proportion of Black Caribbean residents and relatively few of South Asian origin, in comparison with greater London (Hatch et al., 2011). By contrast, Tower

Hamlets has a high proportion of South Asian residents. None the less, that study offered a better foregrounding to the present study than national estimates, especially as it covers an area of similarly high deprivation.

The study found that rates of mental disorder and substance use were significantly higher in this urban and ethnically diverse population than in the general population in England. It also revealed that the rate of exposure to traumatic risk factors for PTSS in South East London was markedly higher than in other European inner cities. In turn, the prevalence of PTSS was high (5.5%), and, strikingly, higher than that reported in the UK military (4.8%), using the same measure (Frissa et al., 2013). While this cannot be assumed to apply to the present study's population, East London is likely to have more in common with South East London than with the rest of England.

An on-going epidemiological study of adolescent health in East London offered further insight, in an ethnically diverse sample. The ORiEL study had mixed results in relation to socio-economic status. Reported levels of wellbeing were significantly higher if families had moderate to high affluence, compared with low affluence. However, there was no association between wellbeing and receiving free school meals, a frequently used measure of poverty. Female adolescents reported significantly lower wellbeing, and adolescents of Indian Asian origin reported significantly higher levels of depressive symptoms. Environmental factors had a strong association with mental health; those who rated their neighbourhoods as 'not safe' or as 'unpleasant' had significantly lower wellbeing and significantly higher depressive symptoms (Smith et al., 2015).

Among other challenges, East London experiences particularly high levels of gang violence. There is no widely accepted definition of gangs or street gangs, partly because they are heterogeneous in nature, and vary within cities as well as between them. Coid et al defined gang membership as "predominantly street-based individuals who see themselves as a discernible group, engage in criminal activity or violence, and are in conflict with similar gangs" (Coid et al., 2013, p. 992). Their survey found that across Britain, 1% of men reported belonging to a gang, whereas in Hackney, East London, 9% did. Given this project's hypothesis on violent injury, it is important to consider possible gang violence in the sample. Researchers have discussed the risk of stereotyping communities by researching gang violence, and it is worth noting that ethnicity was not clearly or strongly associated with gang membership in England and Wales (Aldridge, Medina, & Ralphs, 2010). However, a cross-government report stated that "ethnicity is an important factor in contextualising gang involvement" (Home Office, 2013, p. 19), as both gangs and ethnic minorities tend to be over-represented in the same areas, typically those that experience multiple deprivation. Discrimination was reported to be among the reasons for getting involved in gangs (Home Office, 2013).

Studies like these suggest there will be geographically and culturally specific outcomes in the present study, and that there is great value in capturing these.

1.6 Literature review summary

PTSS prevalence is typically high following injury, although prevalence rates vary widely in different populations. While there is a good deal of research into the psychological impact of major trauma, little has been conducted in the UK in recent years. Given the specificity of prevalence rates, there would be value in studies of UK samples. Indeed, recent research has called for more 'local thinking' on mental health (Hatch et al., 2012). Local information would help to target services more efficiently. Similarly, ethnic differences need to be studied in specific contexts, to avoid findings that are too generalised to be useful.

PTSS is frequently comorbid with other conditions, including alcohol dependence and symptoms of depression and anxiety. However, these comorbidities have often been overlooked in trauma and facial trauma studies. Although there is debate about acute stress, the research suggests it has some value as a predictor of later PTSS.

PTSS in patients injured by violent means appears to be more severe than in those injured in accidents. The reasons for this are not well understood, and theories remain hypothetical. The nature and severity of violent injury varies according to context, and this may modify the consequences for mental health. Few studies have considered depressive symptoms following violence.

Many factors have been reported to contribute to poor mental health. These factors include female gender, ethnic minority status, previous psychiatric history, alcohol misuse, poor social support, certain coping styles, childhood adversity and prior exposure to traumatic events. This accentuates the need for research that includes extensive measures. This presents a challenge, however, in gathering detailed information from participants, some of whom may have the chaotic lifestyles associated with higher risk of trauma. In facial injury research, most studies were small, with samples of 60 or fewer. However, the need for larger studies has to be balanced with the need to consider many measures.

The field of appearance research is growing rapidly. There is increasing awareness that both real and perceived changes to appearance can have a psychosocial impact. However, to date there has been little intersection between appearance research and trauma research. Therefore, both researchers and clinicians may overlook important aspects of the recovery process. It has been reported that even minor disfigurements and those that are not easily apparent can lead to worse outcomes. This

highlights the importance of considering appearance concerns even when changes are not immediately visible.

1.7 Aims and hypotheses

Pilot study

The scientific aims of the pilot study were:

a. To measure the prevalence in patients with traumatic facial injury of psychological distress (clinically significant symptoms of acute stress, depression and anxiety). The outcome measures were:

   - PTSS measured using the ASDS (Acute Stress Disorder Scale (Bryant, Moulds, & Guthrie, 2000));
   - Depressive and anxiety symptoms measured using the HADS (Hospital Anxiety and Depression Scale, Depression subscale (Zigmond & Snaith, 1983));

b. To explore the treatment needs of facial injury patients;

   - Measured using questions devised by the research team.

Prospective study

The prospective study aimed to measure the **prevalence** in patients with traumatic injury of:

a. Psychological distress (clinically significant PTSS including acute stress symptoms, and clinically significant depressive and anxiety symptoms). The outcome measures were:

   - PTSS measured using the ASDS and PCL-S (Post-traumatic Stress Checklist – Specific (Blanchard, 1996));
   - Depressive and anxiety symptoms measured using the HADS;

b. Adjustment problems to visible difference (or perceived visible difference). The outcome measure was;

- Appearance concerns measured using the DAS24; (Derriford Appearance Scale (Carr et al., 2005)).

The three hypotheses under test, using the same outcome measures, were:

I. Patients with traumatic injuries sustained as a result of i) **interpersonal violent trauma** will experience more problems than those resulting from ii) non-violent trauma. Violent trauma patients will experience:

   a. Increased risk of psychological distress (PTSS, depressive and anxiety symptoms);

   b. Higher appearance concern scores;

II. Patients with traumatic injuries i) requiring treatment for **facial injuries** will experience more problems than ii) those not requiring treatment for facial injuries. Patients being treated for facial injuries will experience:

   a. Increased risk of psychological distress (PTSS, depressive and anxiety symptoms);

   b. Higher appearance concern scores;

III. The prevalence of psychological distress is mediated by explanatory factors. Based on the review of the literature, it is proposed that the following psychosocial factors have an association with high levels of symptoms of distress:
   a. A past history of mental health problems;
   b. Current alcohol misuse;
   c. Lower wellbeing;
   d. Poor quality of life, on physical, psychological, social, environmental and spiritual domains;
   e. Low levels of positive social support, and high levels of negative aspects of social support;
   f. Subjective disfigurement ratings;
   g. Childhood trauma;
   h. Recent traumatic life events.

Information was also gathered on the use of coping strategies but no predictions were made on the direction of associations. The questionnaires that assessed these factors are detailed in section 3.2.

1.8 Introduction to design and methods

The study used a quantitative approach incorporating two separate studies. The first study (Chapter 2) was a pilot study conducted as a cross-sectional audit of patients attending facial trauma outpatient OMFS clinics at the Royal London Hospital. Its strength lay in establishing the prevalence of distress in facial trauma clinics, and the willingness of patients to receive psychological treatment. The main study (Chapters 3 to 6) was a prospective study of inpatients being treated by OMFS or major trauma at the Royal London Hospital. Its larger size and the breadth of psychosocial measures obtained allowed a comparison of the prevalence of distress in the two trauma samples, and a detailed exploration of risk factors for high distress. In particular, it was powered to investigate the hypotheses that i) violent injury and ii) facial injury would be associated with worse psychological outcomes. In addition, it aimed to assess iii) the effects of explanatory psychosocial variables on the outcomes. Together, these studies explore prognostic markers for psychological distress following traumatic injury.

Participant vignettes collected in the prospective study were analysed for a qualitative thesis by an MSc student (Skinner, 2014). The results of this qualitative analysis are included in Appendix 9.10, and are considered in the Discussion.

2 Pilot study: methods, results and discussion

The pilot study was an audit of psychological outcomes in a cross-sectional sample of facial trauma outpatients. The main aim of this study was to inform the design of the larger prospective study. The rationale, methods and results for the pilot study are presented in this chapter. The findings are discussed, including implications for the design of the prospective study.

The pilot study was a clinical audit of patients attending facial trauma outpatient clinics. Its main aim was to inform the design of the larger prospective study. It was carried out in the three-month period of January to March 2012. This study supported the prospective study by:

1. Providing an introduction to facial trauma patients and their experiences;
2. Providing an introduction to the clinics and surgeons involved;
3. Acting as a pilot of the key questionnaires.

2.1 Pilot study methods

Over three months, patients were invited to complete questionnaires while attending either the OMFS facial trauma clinic held on Mondays at the Royal London Hospital, or the OMFS head and neck cancer clinic at St Bartholomew's Hospital on Wednesdays. The study was carried out as part of a clinical effectiveness audit registered with the Clinical Effectiveness Unit for Barts Health NHS Trust (approved 08/12/11). Data were collected on head and neck cancer patients to inform a parallel study. The findings on cancer patients are not considered here, however, the combined data are discussed in the published article (Shiraz, Rahtz, Bhui, Hutchison, & Korszun, 2014); the full article is provided in Appendix 9.1.

The research aims of this pilot study, besides informing the prospective study, were:

1. To establish the prevalence of psychological distress in outpatients being treated for facial trauma, measured by:
    a. Acute stress disorder symptoms;
    b. Anxiety symptoms;
    c. Depressive symptoms.
2. To explore patients' perceptions of unmet needs, especially emotional needs, and poor quality of life;
3. To explore patients' willingness to receive psychological treatment, if recommended by the treatment team.

2.1.1 Participants

Participants were identified from clinic lists with the advice of consultant surgeons. All eligible patients who attended their appointments were approached where possible; some were missed at random, for example if there had not been enough time to approach them between their arrival and treatment. Patients were approached in the waiting room before their appointment with the surgeon.

The inclusion criteria were:

- Being treated for facial trauma by OMFS at the Royal London Hospital.
- Aged 18 or more;
- Speaking English.

Exclusion criteria:

- Active psychosis;
- Cognitive impairment, whether pre-existing or because of the injury.

2.1.2 Measures and procedure

All patients were invited to complete a short questionnaire comprising the following measures. (All questionnaires are reproduced in full in Appendix 9.6).

1. Acute stress symptoms (the **Acute Stress Disorder Scale**, (Bryant et al., 2000) ASDS). The measure is based on the DSM-IV description of ASD; it is an inventory of 19 ASD symptoms. Compared with a psychiatric interview (the ASD interview) the measure has good sensitivity (95%) and specificity (83%). It is considered a modest predictor of PTSD in the sense that although it correctly identified the majority (91%) of people who developed PTSD, it also identified a third who did not develop PTSD (Bryant et al., 2000). The ASDS is appropriate for use in civilian as opposed to military trauma. A detailed comparison of possible measures of PTSS was made, and is provided in Appendix 9.3. While the author of the ASDS suggests several possible means of scoring, a simple cut-off of scores ≥56 provides the strongest predictor of PTSD (Bryant et al., 2000), and was used here.

2. Anxiety and depression symptoms (**Hospital Anxiety and Depression Scale** (Zigmond & Snaith, 1983) HADS). The HADS is a widely used and well-validated measure that assesses seven symptoms of depression and seven of anxiety. It was designed to screen for mood disorders in hospital patients and therefore excludes physical symptoms, allowing psychological distress to be identified in those with physical complaints. A scoring system is not prescribed, but the authors suggest that scores ≥8 are indicative of mild to moderate disorder; this cut-off was used in the present study. The measure has good reliability, including test-retest reliability (Crawford & Henry, 2001).

3. Quality of Life (**World Health Organisation – Quality of Life, short version** (Skevington, Lotfy, & O'Connell, 2004) WHOQOL-BREF). The measure has been validated for assessing quality of life in culturally diverse populations, as well as in various clinical populations. For

brevity, only two overall questions were used from the 26-item measure. The global question 'How would you rate your quality of life?' was used in analyses. It is scored on a five point Likert-type scale.

4. **Treatment needs questions**. The research team – two PhD students in Psychiatry, two psychiatrists and one OMFS consultant – devised a set of questions that covered:

    - Physical, emotional and other needs, and the extent to which these had been met;
    - Perceived unmet needs;
    - Whether respondents had sought help for emotional concerns related to their treatment;
    - Whom they had approached, and whom they would be willing to see.

These questions had not previously been validated, but allowed collection of very specific data where existing measures would not have sufficed. These questions are included in Appendix 9.8.

2.1.3 Analyses

Data were analysed using SPSS statistics software (IBM Corp. 2013. *IBM SPSS Statistics for Windows, Version 22.0*. Armonk, NY: IBM Corp.). Data on the prevalence of distress were considered descriptively. A Mann–Whitney U test was used to evaluate differences in quality of life.

2.2 Pilot study results

In total, 96 facial trauma patients took part. Among those who did not take part, five did not speak English; two had cognitive impairment; three had vision problems that prevented them from taking part; nine declined to take part. Thirty-two (32) patients were not approached due to time constraints.

Table 3 shows how long after their injury participants completed questionnaires, where known. For 32 of the participants (33%), data were not available on the date of injury. Missing data on date of injury were missing completely at random.

Table 3: Time elapsed between injury and recruitment, where known.

	N	(Col %)
Within first four weeks	44	(68.75)
Four to eight weeks	6	(9.38)
Nine weeks to one year	9	(14.06)
More than one year	5	(7.81)

Among participants whose date of injury was known, more than two thirds had been injured within the past month, and a further 9% within the past two months.

2.2.1 Demographics

Table 4 presents the demographic characteristics of the sample.

Table 4: Participant demographics

		N	(Column %)
Total		96	(100.00)
Gender	Male	83	(86.46)
	Female	13	(13.54)
Age	18-35	57	(59.38)
	36-65	33	(34.38)
	66+	4	(4.17)
	Not known	2	(2.08)
Ethnicity	White	58	(60.42)
	Asian	18	(18.75)
	Black	6	(6.25)
	Other	10	(10.42)
	Not known	4	(4.17)

The sample was predominantly male: one in seven participants was female. Participants were also relatively young; almost two thirds were under the age of 36. The majority of participants identified themselves as white, although there was also a fair proportion who identified as Asian.

2.2.2 Psychological distress

Table 5 presents the prevalence of clinically significant symptoms of acute stress, depression and anxiety, stratified by gender, age and ethnicity. Caution should be exercised where the sample in a group is small.

Table 5: Prevalence of clinically significant symptoms (cut-off scores of: ASDS ≥56, HADS-D ≥8, HADS-A ≥8)

		ASDS	High scores		HADS-D	High scores		HADS-A	High scores	
		Total	N	(Col %)	Total	N	(Col %)	Total	N	(Col %)
Total		91	39	(42.86)	85	36	(42.35)	81	34	(41.98)
Gender	Male	78	34	(43.59)	73	31	(42.47)	69	29	(42.03)
	Female	13	5	(38.46)	12	5	(41.67)	12	5	(41.67)
Age	18-35	55	25	(45.45)	53	24	(45.28)	52	21	(40.38)
	36-65	30	12	(40.00)	27	9	(33.33)	25	10	(40.00)
	66+	4	1	(25.00)	3	2	(66.67)	2	2	(100.00)
	Not known	2	1	(50.00)	2	1	(50.00)	2	1	(50.00)
Ethnicity	White	56	23	(41.07)	51	16	(31.37)	48	16	(33.33)
	Asian	16	6	(37.50)	15	11	(73.33)	15	8	(53.33)
	Black	6	3	(50.00)	6	2	(33.33)	5	4	(80.00)
	Other	9	5	(55.56)	9	6	(66.67)	9	5	(55.56)
	Not known	4	2	(50.00)	4	1	(25.00)	4	1	(25.00)

Overall, the prevalence of distress was high, with over 40% of participants' scores reaching clinically significant levels for acute stress, depression and anxiety. The prevalence of acute distress was similar across all demographic groups. However, the prevalence of depressive symptoms appeared to be higher among people who identified as Asian. Anxiety symptoms appeared to more prevalent among Asian and Black groups. There were no significant differences by gender.

2.2.3 Quality of life

Quality of life scores were stratified and tested among those with high and low levels of symptoms on acute stress, depression and anxiety; these are shown in Table 6.

Table 6: Mean and sum rank scores of overall quality of life and levels of psychological distress

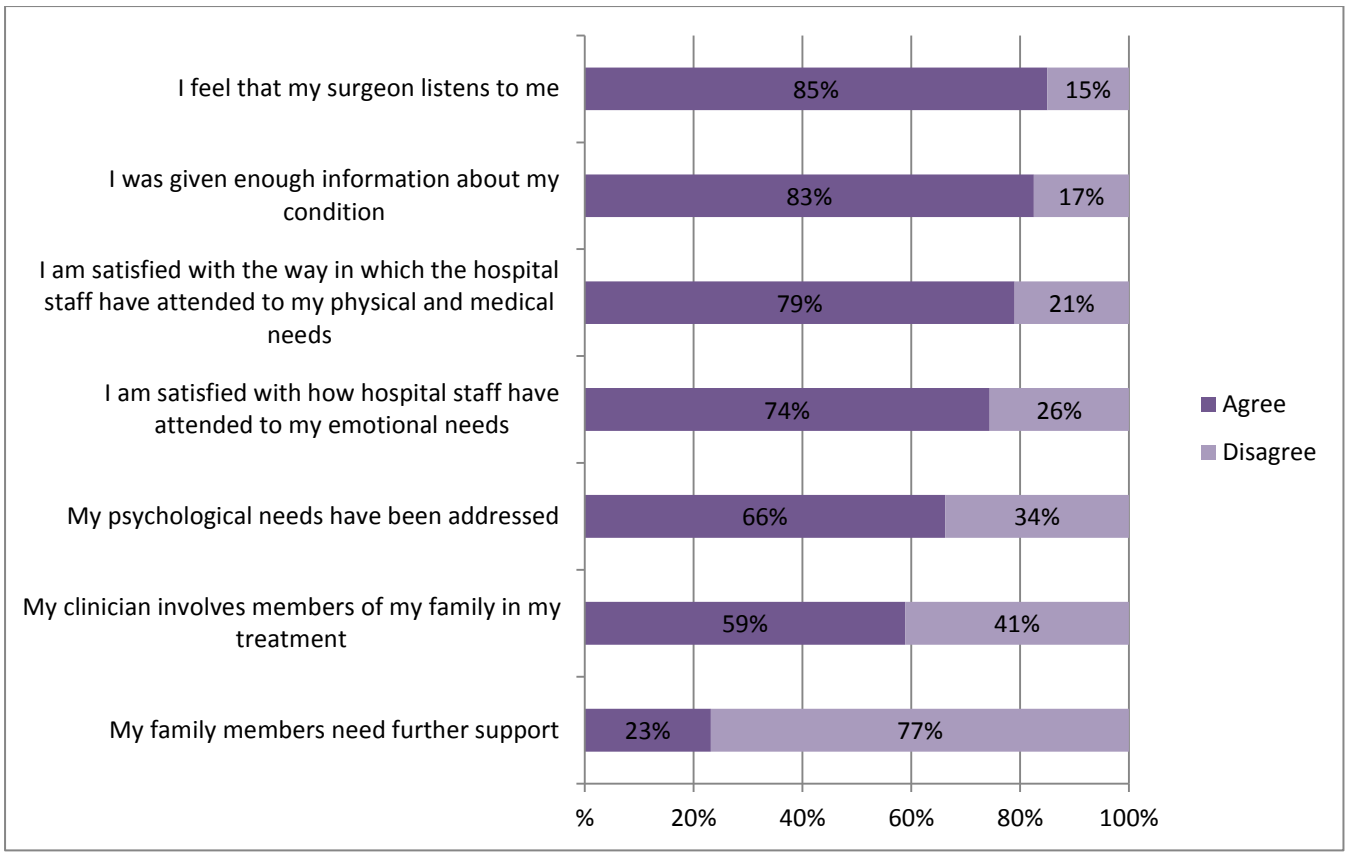
		N	Mean rank of QoL score	Sum of ranks
Acute stress	High	39	34.62	1350
	Low	50	53.10	2655
Depression	High	35	25.29	885
	Low	48	54.19	2601
Anxiety	High	33	28.85	952
	Low	46	48.00	2208

Quality of life had an inverse association with psychological distress: people with clinically significant symptoms were more likely to report poor quality of life. This effect was significant for acute stress ($z = -3.82$, $p < .001$), depression ($z = -5.64$, $p < .001$) and anxiety symptoms ($z = -3.50$, $p < .001$).

2.2.4 Treatment needs

Questions regarding satisfaction with treatment were devised by the team and were asked using a four point Likert-type response scale: Strongly agree, Agree, Disagree, Strongly disagree. These were combined into Agree and Disagree categories for analysis, and are presented in Figure 1.

Figure 1: Proportion of participants satisfied with treatment (n = 94)



Satisfaction with hospital staff and hospital procedures was high, with the majority saying they were satisfied with information they had been given, interactions with their surgeon, and the way staff had dealt with their physical and emotional needs. Two thirds felt their psychological needs had been addressed. Just under two thirds agreed that their family had been involved in their treatment. Agreement was lowest with the question relating to the unmet emotional needs of family members.

Two questions devised by the research team asked about patients' experiences of seeking emotional support (Table 7), and their willingness to receive emotional support if recommended by their treatment team (Table 8).

Table 7: Proportion of patients who had sought emotional help from each source (n = 94)

	N	Col %
Family or friends	10	(10.87)
GP	7	(7.61)
Consultant Surgeon	4	(4.35)
Counsellor, psychologist, psychiatrist	2	(2.17)
Nurse	1	(1.09)
A religious or spiritual adviser, such as a vicar, priest or imam	0	(0.00)
Social Worker	0	(0.00)
I have not seen anyone about my emotional needs	70	(74.47)

Three quarters of people had not sought any emotional help. Among those who had, family and friends were the most common choice, followed by GPs and consultant surgeons. In total, 15% had sought help from a medical or psychological professional.

Table 8: Proportion willing to see each of the following about their emotional needs (multiple-choice question, n = 94)

	N	Col %
Counsellor, psychologist, psychiatrist	44	(48.35)
Nurse	26	(28.57)
Patient support group	19	(20.88)
Social Worker	16	(17.58)
Other	1	(3.23)
Would not be willing to see anyone	27	(29.67)

Over two thirds of people were willing to be treated for their emotional needs if their clinical team recommended this course of action. Almost half were willing to see a counsellor, psychologist or psychiatrist. Over a quarter of participants were willing to speak to a nurse, while around one in five would consider patient support groups or social workers.

2.3 Pilot study discussion

The facial trauma outpatients were predominantly male (86%) and young, with the majority (59%) aged under 35. Most participants identified as white (60%), although there was a fair representation of minority ethnic groups, in particular Asian participants who made up almost one in five participants (19%).

Overall, 43% of patients had clinically significant symptoms of acute stress: this was higher than in most previous samples of facial trauma patients. One Scottish study (Hull et al., 2003) reported similar levels, with 41% meeting PTSD criteria at four to six weeks. However, levels were lower in other studies, ranging from 27% (Bisson et al., 1997) and 25% (Glynn et al., 2003) to as low as 3% (Ukpong et al., 2007); all measured prevalence in a similar time frame to the present study, between one and two months after injury. In this sample, the prevalence of acute stress symptoms was similar in different demographic groups.

The findings for acute stress need to be considered with the caveat that time-since-injury was not recorded for all participants, and was known to be more than four weeks for some participants. Sixty nine per cent (69%) were responding within four weeks of injury. Beyond these participants, acute stress was not strictly an appropriate diagnosis or measure. However, the symptoms described map closely onto those of PTSD in the DSM, as discussed in the literature review, and can therefore be assumed to provide an accurate estimation of PTSS.

Depressive and anxiety symptoms were both present in 42% of participants. Estimates of prevalence have varied in the few studies conducted on facial trauma patients. None the less, the present prevalences were at the higher end of previous estimates. Levels of depressive and anxiety symptoms were similar regardless of gender. This was unexpected, given that in the general population, both depression and anxiety are more common among women (McManus, Meltzer, Brugha, Bebbington, & Jenkins, 2009). A previous British study reported that female facial trauma patients were at significantly higher risk of depressive and anxiety symptoms than men (Islam et al., 2010). It seems likely that there are gender differences, and adjusted models from larger studies may reveal them.

Levels of depressive symptoms were markedly higher among Asian participants than other ethnic groups, with 73% reporting clinically significant symptoms. Levels were also higher in the 'other' ethnic category (67%), which comprised mixed ethnic groups and those who did not consider themselves white, black or Asian. The modest sample sizes made it difficult to draw firm conclusions. However, ethnic differences have not been reported in previous studies of facial trauma patients.

These findings indicate there may be important differences, and that they should be considered in future larger studies.

The high prevalence of distress in this population and questions around the thresholds used are addressed further in section 4.4.4.

There was a clear association between quality of life and psychological distress, with significantly lower levels of quality of life seen for those with clinically significant symptoms of acute stress, depression and anxiety. Similar associations have been observed in trauma patients in the past (Baranyi et al., 2010; Bryant et al., 2010).

The questions regarding treatment needs revealed a largely positive story. The majority of participants reported good interactions with their surgeons, saying that they felt their surgeon listened to them (85%) and that they had been given enough information about their condition (83%). This reflected well on clinical teams. It also agreed with qualitative research into trauma patients' experiences of hospital: a recent study in the UK reported that patients felt that information they were given met their needs, and that this useful information inspired confidence in clinical staff (Sleney et al., 2014). In the present study, satisfaction with hospital staff was high, with around three quarters of participants saying they were pleased with the way staff had dealt with their emotional (74%) as well as physical and medical needs (79%).

However, there were some anomalies. Two thirds of participants (66%) were satisfied that their psychological needs had been addressed. This seemed incongruent given the high proportion with significant psychological distress, and the small proportion who had sought professional help for emotional needs. This suggested that at least some participants lacked insight into their own psychological state, and were therefore likely to benefit from assessment – whether by clinicians or using validated questionnaires – and professional guidance.

A majority (59%) felt that the clinician had involved their family in their treatment. It was evident during fieldwork that many patients attended the clinic alone, and one might question whether they wanted their families involved. However, the family is often a source of social support, and can mediate the negative effects of distress. Family members are likely to be concerned about an injury, and if they are excluded from treatment decisions, they may have heightened anxieties about the patient. Just under a quarter of study participants (23%) stated that their family needed further support. The needs of families and partners are increasingly being considered in other clinical contexts such as psycho-oncology (Kamen et al., 2015; Mellon, Kershaw, & Northouse, 2007), and the findings suggest that families and patients can influence one another's emotional states. This

does not appear to have been researched among trauma patients, but these findings indicate that there may be unmet needs among family members as well as patients.

Only one quarter of participants (26%) had sought emotional support: this was striking in light of the high levels of psychological distress. Patients with significant symptoms may not have recognised or acknowledged their psychological symptoms. There is a precedent for trauma patients having limited insight into their own psychological state. In an American qualitative study, trauma patients who had been screened and found to have symptoms consistent with a PTSD diagnosis were then interviewed about their illness perceptions. Although many were able to describe their symptoms, none used the term PTSD, and they had difficulty interpreting or understanding the symptoms. None of the 36 qualitative participants had sought psychological support, and few thought their symptoms merited professional help. Symptoms were often attributed to physical impairment and pain, and were believed to be transient (Wong & Kennedy, 2011). These findings, along with the results of the present study, suggest trauma patients are ill placed to identify their own psychological needs.

Alternatively, it may have been too soon for participants to have sought psychological help; most were attending the clinic within one or two months of injury. They may have intended to discuss psychological issues during the appointment for which they had come to hospital, or may have expected symptoms to dissipate over time.

Most people who had sought help had approached family and friends (11%): while these certainly have a central role, professional support may be needed when symptoms are severe or persistent. In addition, those with significant symptoms could find it increasingly hard to relate to friends and family members, for example if they experience avoidant symptoms, or increased irritability. Just under one in seven (15%) had sought emotional advice from a professional, namely a GP, surgeon, counsellor, psychologist, psychiatrist or nurse.

More positively, the majority of participants were willing to be treated for their emotional needs if this were recommended by their treatment team. Two thirds (70%) were willing to see someone, and the most popular option was a counsellor, psychologist or psychiatrist, which was deemed acceptable to almost half (48%).

Discussion of practicalities

In addition to the empirical findings, the pilot study also informed the practicalities of conducting the prospective study. The questionnaires themselves were well received by patients, who had few problems understanding or completing them.

One clear obstacle emerged; towards the end of the pilot phase, another research study was begun in the facial trauma clinic. Although it shared some aims, its methods and key questions differed, and it was not feasible to collaborate. However, conducting two studies on largely the same population could have placed undue burden on the patients. Following discussion with consultant surgeons, in particular Prof I. Hutchison, we agreed to focus on two separate cohorts. The other researchers continued researching facial trauma outpatients (i.e. those being discharged from A&E for later review), while I shifted the focus of my prospective study to facial trauma inpatients (i.e. those being admitted as inpatients from A&E for treatment within a couple of days) (I. Hutchison, personal communication). To avoid any patients being recruited to both studies, patients had a visible recruitment sticker attached to their medical notes. As a note, data from the other study have not been published.

This shift to the inpatient population, with typically more severe injuries, gave rise to additional issues and necessitated further changes, specifically expanding the population to trauma patients as well as facial trauma patients. This is discussed in more detail in the following chapter.

2.4 Key findings

- The pilot study was valuable as an introduction to the clinic and patient group, and helped shape the prospective study.
- Distress was high on the psychological measures of acute stress, depressive and anxiety symptoms.
- There was a suggestion of differences according to ethnic group, with higher depressive symptoms among people who identified as Asian.
- Few participants had sought emotional support, but most were receptive to the idea.

3 Prospective study: methods

The full methods of the prospective study are explained. This includes the definition of the sample population, and description of the measures, procedures, and the timing of follow up waves. Analysis plans that will test the hypotheses are described.

While the pilot study was under way, the prospective study was being planned, and towards the end of the pilot fieldwork, the protocol was submitted for approval. Ethical approval for the study was sought from the National Research Ethics Service (NRES), the NHS Health Research Authority, through the Camberwell St Giles Committee. Approval was received on 23rd May 2012 (reference 12/LO/0351). We later sought an amendment, discussed below, and received approval on 15th May 2013.

This chapter deals with the full final methods, but an understanding of changes that occurred during fieldwork will clarify the differences between the pilot study and this prospective study. The pilot study focussed on facial trauma outpatients, but due to research being carried out by another team, the focus of the prospective study shifted to facial trauma inpatients rather than outpatients, as discussed in section 2.3. Although this is a broadly similar population, some important differences emerged. By definition, patients admitted to hospital have more severe injuries and often more extensive injuries. Many had other non-facial injuries and were under the joint care of major trauma and OMFS. They wanted to discuss their full experience, and the focus on their facial injury seemed arbitrary. This led me to question the nature of injuries to the face as opposed to the rest of the body.

Consequently, I reconsidered my objectives and returned to the literature. It became clear that there were no papers comparing the effects of facial and non-facial injury, and that this was an important question to explore. I expanded the literature review accordingly and added this hypothesis to the study. I applied for ethical approval to expand the patient population, which was granted. The methods, sample and power calculations in this chapter are those for the full eventual population.

3.1 Participants

Recruitment took place in the Royal London Hospital between July 2012 and April 2014. Participants were identified from ward lists at multidisciplinary meetings. I attended multidisciplinary meetings, typically bi-weekly, successfully recruiting patients on 103 days. Patients were approached on the wards. Participants were aged at least 18; there was no upper age limit. They spoke English: this excluded a substantial proportion of patients from the diverse East London population, but it was not possible to obtain informed consent or administer questionnaires and interviews in other languages; furthermore, the standard questionnaires are not available in all languages.

Inclusion criteria:

- Admitted as inpatients to the major trauma ward, Royal London Hospital and/or;
- Admitted as inpatients under the OMFS specialty, Royal London Hospital and;
- Aged 18 or more;
- Speak English.

Exclusion criteria:

- Active psychosis;
- Admitted following suicide attempt or deliberate self-harm;
- Cognitive impairment, whether pre-existing or resulting from the injury.

In practice, further exclusion criteria arose. Patients being treated in the Intensive Care Unit (ICU) or High Dependency Unit (HDU) could not be recruited for practical and ethical reasons. If they were later discharged to major trauma services, they became eligible. The cognitive impairment criterion was expanded to include those still under the influence of alcohol or drugs, as they could not be expected to give informed consent. A note was made against ward lists of reasons for ineligibility: this provided data to understand systematic bias. A similar note was made when patients declined to take part.

Major trauma patients

Eligible major trauma participants were identified at a bi-weekly multi-disciplinary meeting. Major trauma is defined retrospectively after injury has been assessed and scored by TARN (the Trauma Audit and Research Network), based on Abbreviated Injury Scale (AIS) scores (Morse et al., 2010).

However all patients were being treated by the major trauma team after having suffered serious injury.

Facial trauma patients

Eligible facial trauma participants were identified at a daily OMFS multi-disciplinary meeting; this was normally attended on the same days that the major trauma meeting ran. Recruitment was limited to those admitted to hospital and treated by OMFS. They were therefore relatively severe facial injury cases, as defined by a UK OMFS survey (Hutchison & Magennis, 1998). Some had been discharged and re-admitted as inpatients for scheduled surgery.

All patients

Participants were recruited to the study and assessed for emotional distress soon after admission, and usually within the first few days; patients whose injuries occurred more than three weeks ago were not recruited. Demographic information was collected on:

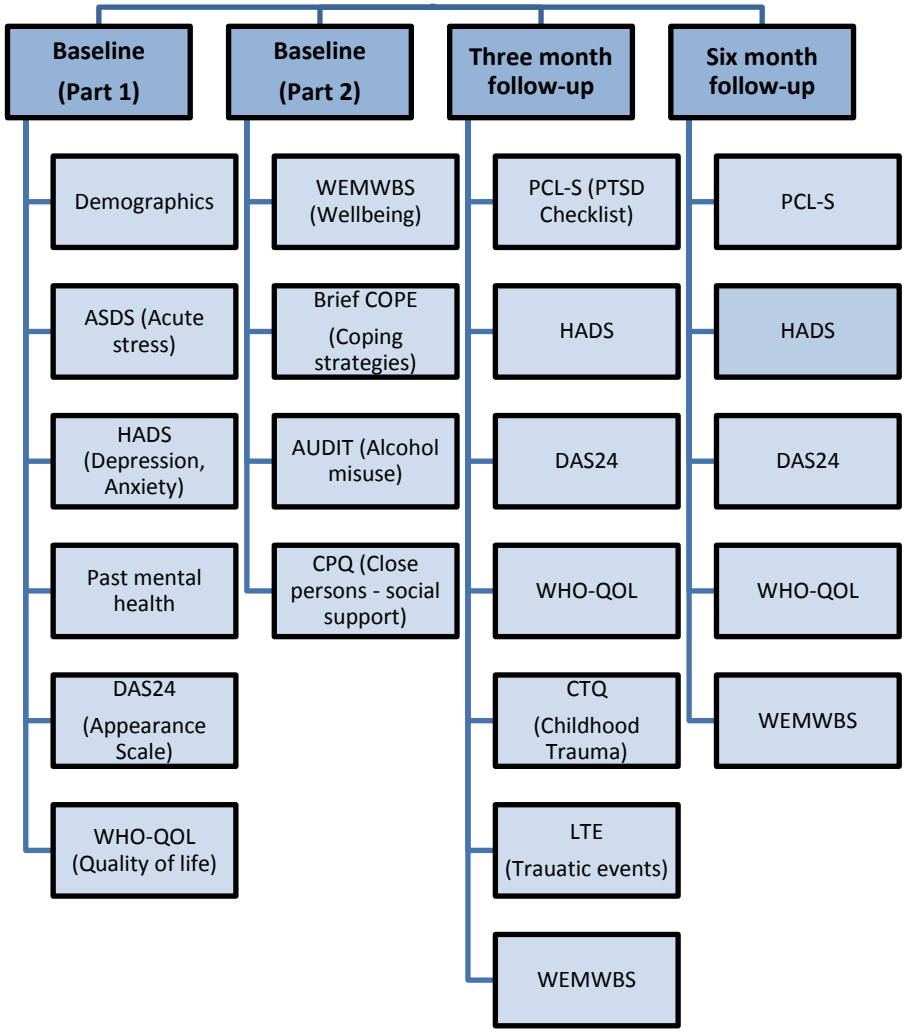
- Age;
- Gender;
- Ethnicity, using UK census categories;
- Whether English was the participant's first language and if not, whether they considered themselves to speak English 'very well', 'well' or 'not well'.
- Religion, using UK census categories;
- Country of birth;
- Parents' country of birth;
- Marital status, using UK census categories;
- Highest level of education;
- Employment status;
- Occupation;
- Monthly income.

3.2 Measures and procedure

The measures used at each wave are described in this section, with a visual overview provided in Figure 2, followed by more detail on each measure. All measures are reproduced in full in Appendix section 9.8. At baseline, 225 patients took part, with 60% responding to one or both follow up waves. At three months, 100 responded, and at six months, 112.

Measures were collected at baseline to capture acute responses. The follow-up points were at three months and six months. Six months was chosen as it was a common measurement point in the literature, and was as long as possible after the event, within the time frame of the project. However, follow up difficulties were anticipated, and it was feared that few participants would respond so long after the event. A three-month follow up of key measures was added to tackle this problem.

Figure 2: Overview of measures used at each wave



3.2.1 Wave One: baseline

Baseline measures were completed in hospital, within three weeks of injury. The time between injury and recruitment varied from the same day to 22 days, with a mean of 4.35 days (*SD* 4.24).The first assessment consisted of self-completion questionnaires measuring the following factors.

1. ASD symptoms (**ASDS**). This measure is detailed in section 2.1.2, as it was also used in the pilot study.

    a. Respondents provided a description of the event that lead to their admission to hospital. This was used to classify injuries as accidental or violent, with crosschecks made using clinical information.

The use of the ASDS here was pragmatic. It captured acute reactions, which could not yet be classified as PTSD symptoms. It also provided data for comparison between these acute symptoms and the same symptoms at follow up.

2. Anxiety and depression symptoms (**HADS**). This measure is detailed in section 2.1.2.

3. Appearance concerns (**the Derriford Appearance Scale, DAS24** (Carr et al., 2005)). This is a 24 item psychometric measure of adjustment to problems of appearance. It covers fear, social anxiety, shame, and negative affect as well as avoidance and withdrawal behaviours. It has high test-retest validity. It is suitable for use in clinical populations and the general population. Scores range from 11 to 96, with each item being rated from 1 to 4, and some items having a 'not applicable' option rated as 0. Of particular value to the present study was the lack of specificity: many existing measures of appearance were discounted for focussing on a particular aspect such as weight, or a clear disfigurement, whereas the DAS24 allows participants to state the aspects of greatest concern to them.

4. **Past mental health**: these five questions address past experience of anxiety and depression, and are used in oncology clinics in St Bartholomew's Hospital. The measure provides a quick, simple assessment of past mental health and has been used in research on OMFS cancer patients (Archer, 2010).

5. Quality of Life (**Brief WHOQOL**). All 26 items were used, rather than the two overall measures selected in the pilot study. In addition, four questions on personal beliefs were added from the full WHOQOL (The WHOQOL Group, 1998), to examine the religious and spiritual beliefs of this culturally diverse population.

6. **Disfigurement scale** (Katz, Irish, Devins, Rodin, & Gullane, 2000). This was completed by patients, and by researchers and OMFS consultants for facial trauma patients. The original version was used for the researcher and OMFS consultants to rate patients' facial injuries. It was important to be able to compare the subjective ratings of patients with these objective ratings, so a modified version asked facial injury patients to rate their own appearance: this replaced most references to 'disfigurement' with 'appearance change' or 'difference'. Ratings were obtained from major trauma patients for comparison: a further modification removed references to the face and instead discussed scars, differences and disfigured areas.

Where possible, patients were asked to complete a second questionnaire in hospital consisting of the following explanatory measures:

7. Wellbeing, using the **Warwick-Edinburgh Mental Wellbeing Scale** (**WEMWBS**), (Tennant et al., 2007). Recent research reflects increasing interest in mental wellbeing, its promotion, and the psychological experiences of those who do not experience psychological distress (WHO, 2004). The pilot study and previous trauma research indicated that typically up to one third of patients experience negative psychological outcomes, but did not explore the experiences of the others. This positively phrased measure comprises 14 items; it has been widely tested in general populations in the UK and has good content validity (Tennant et al., 2007).

8. Strength of social support networks, using the **Close Persons Questionnaire** (**CPQ**) (Stansfeld & Marmot, 1992). The measure was derived for the Whitehall II epidemiological studies and has domains of confiding and emotional support, practical support, and negative aspects of support (encompassing needing more support and worsening social relationships). It covers quality, quantity and source of social support. An advantage of this measure is that the close person is subjective and nominated by the participant, rather than being dictated by social role, such as partner or spouse. The standard questionnaire allows participants to nominate up to four close persons, however analysis in the Whitehall II study only analysed domains for the first close person (Stansfeld, Bosma, Hemingway, & Marmot; Stansfeld, Fuhrer, & Shipley, 1998). With this precedent, and for brevity, this questionnaire restricted responses to one close person.

9. Coping strategies using the **Brief COPE** questionnaire (Carver, 1997). This covers 14 distinct domains of coping reactions, such as humour, self-blame, denial and positive reframing.

10. Alcohol misuse using the **Alcohol Use Disorders Identification Test** (**AUDIT**) (Bush & Kivlahan, 1998). This measure was a later addition as it became clear that a substantial proportion of patients had been injured as a direct or indirect result of alcohol misuse. In some cases this was long-term misuse, in others an alcohol-fuelled incident. While this information was frequently discussed in multi-disciplinary meetings, it was not recorded in any systematic way in medical notes. An amendment to the ethics application was sought and granted, to use the AUDIT. Its ten items explore alcohol consumption habits, and it is sensitive to potentially problematic drinking habits at the lower end of the spectrum, as well as established alcoholism (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993). Scores above eight are indicative of harmful or hazardous behaviour, and those above 13 for women and 15 for men are indicative of alcohol dependence.

    a. Once it was introduced, the AUDIT was collected at all three waves in order to test for associations between alcohol use and psychological outcomes. However, insufficient data were collected to use it in adjusted models. Therefore, only baseline data are reported and used in this thesis.

If patients were not able to able to complete the questionnaire immediately, it was provided with a freepost return envelope.

All patients were sent a copy of their consent form with a thank you letter. We intended this to be a positive reminder of the project and to improve participation rates in the later stages.

Questionnaires were provided in paper form and completed by patients themselves where possible. When this was not possible, questionnaires were read aloud, in full; this was typically because the patient could not read or write due to their injuries or not having glasses/contact lenses with them. It is acknowledged that some measures are intended for self-completion and have not been validated for use as an interview. However, it was preferable to obtain the information from participants than to exclude them and thus introduce bias. Thirty four (34) patients had questionnaires read to them. Responses were compared between those needing and not needing assistance: there were no significant differences on physical, demographic, or psychological outcome variables.

I wrote a detailed vignette for each patient as they were recruited, summarising the event that had led to their injury and including any emotional responses and other relevant information not covered elsewhere in the questionnaires. This could include information raised in the multi-disciplinary meetings, information volunteered by the patient or elicited during conversation, and my own observations. They provided a reference point to check any anomalous results. Patients were reviewed on a case-by-case basis with Prof Korszun.

3.2.2 Wave Two: three months

Patients were sent a set of follow-up questionnaires at three months. The measures were:

11. Symptoms of PTSD (the **PTSD Checklist – Specific version, PCL-S**) (Blanchard, 1996). The measure has strong test-retest reliability and high internal consistency (Norris & Hamblen, 2003). The PCL-S was chosen over other measures of PTSD as it covers symptoms more comprehensively, including those in DSM-V. The 'specific' version PCL (the PCL-S) was used as its phrasing is framed to a recent specific event, in this case "the event which led to you coming to hospital". It consists of 17 items.

The measures used for stress reactions, the ASDS and PCL-S, were chosen because they measure the same DSM-IV items, with the following exceptions. The ASDS asks "During or after the trauma, did you ever feel in a daze?" and "During or after the trauma, did you ever feel distant from your normal self or like you were watching it happen from outside?" These two items recognise the dissociative symptoms that are given more emphasis in ASD: they are not covered by PCL-S or other PTSD measures. The PCL-S asks about "Loss of interest in activities that you used to enjoy?" and "Feeling as if your future will somehow be cut short" which do not have equivalents in the ASDS. The Impact of Events Scale (IES-R) is widely used but omits three key DSM-IV (American Psychiatric Association, 2013) symptoms for diagnosing PTSD: "inability to recall an important aspect of the trauma", "markedly diminished interest or participation in significant activities" and "sense of foreshortened future (e.g. does not expect to have a career, marriage, children, or a normal life span)". The IES-R was therefore rejected. An item-by-item comparison of the measures, alongside the DSM-IV diagnostic criteria, shows how closely the ASDS and PCL-S map onto each other. This is provided in Appendix 9.3.

12. Anxiety and depression symptoms (**HADS**);

13. Appearance concerns (**DAS24**);

14. **Disfigurement scale**;

15. Quality of life (**Brief WHOQOL**);

16. Wellbeing (**WEMWBS**);

17. Alcohol misuse (**AUDIT**);

18. Childhood adversity using the **Childhood Trauma Questionnaire** short form (**CTQ**) (Bernstein, 2003). Growing evidence supports the role of early life trauma in negative psychological outcomes in later life. This validated, shortened 28-item measure covers childhood maltreatment in the domains of physical, sexual, and emotional abuse, and physical and emotional neglect; three items assess possible minimisation or denial. The total score was used due to small numbers of cases in each subdomain.

19. Adversity in the past six months (the **List of Threatening Experiences**, **LTE**, (Brugha & Cragg, 1990)). This measure gives 12 experiences, which are rated 'yes' or 'no'. The first item asks whether 'You yourself suffered a serious illness, injury or assault': since all participants had by definition experienced this, a further item was added which asked 'You yourself suffered a serious illness, injury or assault, excluding the one you were treated in hospital for'.

A number of tactics were employed to increase response. They included personally written envelopes and freepost return envelopes. Participants were contacted by text message to alert them that a questionnaire was in the post, and reminded by text if necessary. Non-responders were sent a second copy of the questionnaire. These approaches were in keeping with recommendations from a review of methods to improve response (Edwards et al., 2002).

3.2.3 Wave Three: six months

At six months, participants were asked to complete a final set of questionnaires, comprising:

20. Symptoms of PTSD (**PCL-S**);

21. Anxiety and depression symptoms (**HADS**);

22. Appearance concerns (**DAS24**);

23. **Disfigurement scale**;

24. Quality of life (**Brief WHOQOL**);

25. Alcohol misuse (**AUDIT**);

26. Wellbeing (**WEMWBS**);

If participants had not responded at three months, the two additional questionnaires from three months (CTQ and LTE) were included in the six-month pack, to maximise responses. If a participant failed to respond to both the three-month and six-month questionnaires, a final short version was sent which contained only the PCL-S and HADS. This achieved responses from a further 15 participants, which were included in the six-month wave for analysis.

Data on the WHOQOL, WEMWBS and AUDIT were collected at all three waves. However, this study only considers and reports the baseline data. The measures were collected at follow up for the purposes of a planned collaboration in future.

Quantitative fieldwork was aided by the participation of a student from the Centre for Psychiatry's MSc in Mental Health, Virginia Kopeschny. After obtaining the necessary honorary contracts and undergoing substantial training, the student was supervised in the first weeks, and subsequently recruited on her own. She obtained informed consent and administered baseline questionnaires to 25 participants. A medical undergraduate student recruited two participants as part of his studies, and another PhD student recruited one participant while researching her own project, both having been trained and supervised in the same way. I sent out all mailings to these participants (to provide consent forms and follow up questionnaires).

3.2.4 Clinical measures

Medical data were collected primarily from the trauma team's research database, and supplemented with information from medical records and multi-disciplinary meetings. This information covered:

1. **Glasgow Coma Scores** (**GCS**) (Teasdale & Jennett, 1974). This assesses level of consciousness in particular after head injury: scores range from 3 (deep unconsciousness) to 15 (full consciousness) and are based on parameters of best eye response, best verbal response and best motor response. The revised scoring of GCS is used at the Royal London Hospital. Patients are often scored a number of times: on scene; on arrival at the hospital; patients transferred from other hospitals may have a score given in transit. As a note, all patients had a GCS of 15 when recruited to the study. The lowest recorded GCS was used for analysis.
2. **Injury Severity Score** (**ISS**) (Baker et al., 1974; Copes et al., 1988). This provides an overall severity score, based on Abbreviated Injury Scores (AIS) for each injury, as specified by TARN. AIS scores are localised and detailed; they are little used directly in research because comparability is rarely feasible. However, they are used as the basis for ISS. ISS scores range

from 0 to 75; scores above 15 signify a major trauma, also called polytrauma or multiple injuries (NCEPOD, 2007). ISS has been shown to correlate highly with mortality, morbidity and duration of hospital stay.

   a. People with an ISS score above 15 more were classified as having suffered polytrauma in the data.

Both measures are only scored for patients under major trauma; they are not applied to those treated only by OMFS. These data were therefore only available on trauma patients.

3. The presence or absence of head injury was coded from clinical injury descriptions. The keywords that indicated head injury were: head injury; skull fracture; concussion; subarachnoid haemorrhage (SAH); subgaleal, epidural, or subdural haematoma (SDH); parenchymal contusion or laceration. In addition, anyone with a GCS below nine was coded as having a head injury. These were derived from conversations in the major trauma multi-disciplinary meeting and confirmed in the literature (Reece & Sege, 2000; Weisberg, Garcia, & Strub, 2012).
   a. It is reasonable to assume that patients with these injuries experienced at least mild traumatic brain injury.
4. Mechanism of injury; this supplemented participants' accounts and was used to check the classification of injuries as violent or accidental;

Further clinical information was collected, but was neither uniformly nor widely available, and was therefore not used in the analyses as they limited sample size. This information was:

5. Treatment in Intensive Care (ICU) or High Dependency Units (HDU). A growing body of literature suggests these experiences can themselves be traumatic and contribute to worse psychological outcomes (Jackson et al., 2014; Wade et al., 2012);
6. Additional information including comorbidities, intoxication on the scene and social information such as suspected alcohol misuse or homelessness.

In addition, for the purpose of this study, surgeons provided ratings on the disfigurement scale (Katz et al., 2000) for facial trauma patients. I had planned to obtain these ratings from the OMFS team on the ward; in practice, this was rarely possible. An amendment to the project was approved in February 2013 to allow photographs of facial injury patients to be taken, if they consented. These could be rated later. Peter McDermott, a consultant OMF surgeon who had not been involved in any of the patients' treatment, rated the 43 photographs using the disfigurement scale. Researcher

disfigurement scores were also recorded to provide a layperson's rating, with neither surgical expertise nor emotional, subjective involvement with the patient.

3.3 Analytic plan and data preparation

The prospective study's hypotheses, to reiterate, were:

To measure the prevalence in patients with traumatic injury of:

a. Psychological distress reactions (clinically significant symptoms of PTSD, depression and anxiety) and;

b. Adjustment problems to visible difference.

1. To test the hypothesis that patients with traumatic injuries sustained following i) interpersonal violent trauma will experience worse outcomes than those resulting from ii) non-violent trauma.

2. To test the hypothesis that patients with traumatic injuries i) requiring treatment for facial injuries will experience worse outcomes than ii) those not requiring treatment for facial injuries.

3. To understand the effects of explanatory psychosocial variables on the outcomes.

The measures of psychological distress (ASDS, PCL-S and HADS) are recorded on continuous scales; recommended cut-off points identify clinically significant symptoms. I used these dichotomised cut-offs as the HADS-A, HADS-D and PCL-S had a strong positive skew which could not be transformed using standard transformation methods, a decision made in consultation with a statistician (M. Smuk, personal communication).

However, the appearance concern measure, the DAS24, is used as a continuous measure or split into tertiles in these data, as the concept does not lend itself to thresholds. The authors of the DAS24 recommend that it be used continuously to avoid pathologising behaviours and feelings which are not linked to a clinical disorder (Moss, 2004). I investigated normality with a Q-Q plot and the data were close to a normal distribution: to strengthen this assumption I used robust standard errors when modelling the DAS24.

3.3.1 Analytic approach

Data were analysed using Stata statistical software (StataCorp. 2007. *Stata 10 Base Reference Manual*. College Station, TX: Stata Press).

The sensitivity analyses used chi squared tests and univariate logistic regressions. Chi squared, Fishers' Exact, T-tests and Mann Whitney U tests were used to understand potential associations between physical, demographic or explanatory variables. The explanatory variables were tested for differences between groups (violent versus accidental, and facial versus non-facial) in case of extraneous effects, using t-tests or Mann Whitney U tests.

Univariate analyses of baseline data

Univariate logistic regressions were fitted to test the hypotheses that psychological outcomes would be worse after i) violent or ii) facial injury, and to understand iii) what other factors influenced the outcomes. These regressions had the baseline psychological measures (significant acute stress, depressive and anxiety symptoms) as outcomes. Physical variables were tested first, including the hypothesis variables of i) mechanism and ii) site of injury. Then demographic variables were tested, and finally the explanatory variables that formed Hypothesis III.

Then univariate robust linear regressions were fitted to the continuous measure of appearance concern, to test the same associations, i.e. physical, then demographic, then psychological factors.

Longitudinal and adjusted analyses

The significant univariate analyses at baseline informed the longitudinal models. Logistic multilevel models were employed to test hypotheses in the longitudinal data; this method is introduced in Chapter 6. These investigated the hypotheses that psychological outcomes would be worse after i) violent or ii) facial injury.

Further questions for analysis

The study included a number of exploratory questions subsidiary to the main hypotheses. Firstly, the analyses needed to test the ability of acute stress (ASDS) to predict follow up PTSS (PCL-S) in this sample. The binary measures were tested for sensitivity, specificity, positive predictive power and negative predictive power.

Secondly, the literature review showed that objective measures of changed appearance – such as those estimated by medical staff – often do not correlate with levels of concern felt by patients. The study's data were tested for this association.

Finally, where possible, the ethno-cultural aspects of mental health were explored. The location for the study is a unique urban environment. The Royal London Hospital is in the council of Tower Hamlets, which encompasses areas of deprivation as well as the wealthy neighbourhoods of Canary Wharf. The area has a particularly diverse community with a high proportion of migrants (Gray,

2003; Tower Hamlets Council, 2011). As a major trauma centre, the hospital also receives patients from across the South East of England. The study population reflected this diversity, and ethnic and socio-economic differences were considered where sample size permitted.

Qualitative analyses

The vignette data collected on participants were subjected to a qualitative analysis by another researcher for an MSc thesis (Skinner, 2014). The qualitative findings inform the discussion of the quantitative results; hence, the qualitative methods are outlined briefly here, and are included fully in Appendix 9.10. The research question was "How do survivors of physical trauma, with mental health symptoms, verbally communicate their traumatic experience" and was explored with a thematic methodology. Analyses were based on a subsample of 42 patients selected for having scores above the stated thresholds on acute stress, depression or anxiety. In addition, those selected had sufficiently detailed vignettes to warrant analysis, and excluded participants recruited in 2014, due to the timing of the analysis.

3.3.2 Statistical power

Power calculations were carried out in the early stages of planning, to ensure sufficient participants were recruited to enable the hypotheses to be statistically tested. Calculations were based upon the outcomes of PTSS, depressive symptoms, and appearance concerns.

It was hypothesised that PCL scores in people being treated for violent injury would be at least five points higher than for accidental injury six months after the event. To observe a significant difference, sample sizes of 67 in each group were required at six months; i.e. 67 with violent injuries and 67 with accidental injuries. Likewise, the facial and non-facial groups would each require 67 participants.

Table 9: Sample distribution required at follow-up to power hypotheses

	Non-violent injury	Violent injury	Total to be used in comparison
Non-facial injury	34	33	67
Facial injury	33	34	67
Total to be used in comparison	67	67	134

I did not intend to compare, for example, the 34 violent facial trauma participants with the 33 non-violent facial trauma participants.

These calculations were based on a previous study of trauma survivors (Zatzick, Roy-Byrne, et al., 2004); the control group received no intervention and was used for comparison. Because of anticipated difficulties following up patients at three and six months, higher numbers of participants were sought at baseline, and even these generous numbers were increased during fieldwork to ensure that the key hypotheses would be statistically powered.

Power calculations were also carried out on the hypotheses relating to HADS and DAS24 scores, to power hypotheses about depressive and anxiety symptoms and appearance concern. Powering these hypotheses required smaller sample sizes than the PTSS hypothesis.

Expected follow-up was discussed with the professor leading the trauma surgery team, who believed, based on his own research with this patient group, that 50% of eligible participants would be lost overall: 25% who could not be recruited in the first place because of refusals etc., and 25% who would be lost to follow up (K. Brohi, personal communication). We aimed to recruit a baseline sample of 180, 25% above required final numbers. During fieldwork, it became clear that follow-up was lower than anticipated, so recruitment continued for longer and a larger baseline sample was obtained.

3.3.3 Data preparation

The procedure for data preparation is fully described in Appendix 9.4. To summarise, both paper and electronic data were stored securely, in accordance with protocols. Double data entry was carried out on all questionnaires to ensure the data file was accurate; four undergraduates assisted with this work, completing approximately half of the data entry. The data file was subjected to extensive checks.

As part of the data cleaning, single missing items were calculated within otherwise complete questionnaires. These were handled according to instruction manuals, where provided. The ASDS, PCL-S, HADS, DAS24, WHOQOL, WEMWBS and CTQ were calculated if a specified minimum number of items were present in a given domain. In general, there were few missing items; most questionnaires had missing items from between 0% and 2% of participants, a few had around 5%, and the highest proportion was seen on the DAS24 (12%). The number of questionnaires calculated this way, and the exact procedures and thresholds, are detailed in Appendix 9.4.

3.3.3.1 Scoring measures

Measures were scored according to published guidelines. However, some measures offered several ways of scoring, and the choices made in such cases are discussed here.

As in the pilot study, the ASDS was analysed with a threshold of scores ≥56. Of several possible thresholds, the authors of the measure found this one was the most accurate prediction of subsequently developing PTSD, and an alternative score based on the presence of symptom clusters provided a poorer prediction than an overall score (Bryant et al., 2000). Research on victims of violent crime further supports the use of an overall diagnosis of ASD to predict PTSD, rather than analysis of symptom clusters (Brewin et al., 1999).

There are two ways of scoring the PCL-S: either using the total score with a cut-off for 'caseness' of PTSD, or ensuring endorsement in each domain, or ideally a combination of the two. In addition, different thresholds are recommended in different populations (VA National Center for PTSD, 2014). In a psychometric analysis of the measure among civilian trauma patients (Blanchard, 1996), a threshold of 44 was identified as having the highest diagnostic efficiency, and was adopted here. Apart from one participant at six months, all participants with high scores (scores ≥45) had endorsed an item in each domain anyway, i.e. they fulfilled criteria on both scoring systems. Therefore, all scores ≥45 were classed as meeting criteria.

The HADS can produce an overall score as well as subscale scores for depressive (HADS-D) and anxiety (HADS-A) symptoms. However, the overall score is rarely used in the trauma literature, so this was rejected. Within each subscale several cut-off points can be used to reflect symptoms which are mild (scores 8 - 10), moderate (11 – 15) or severe (16 and above) (Crawford & Henry, 2001). The threshold of eight was used, thereby identifying everyone with clinically significant symptoms. In a review of studies using the HADS, this threshold was found to provide the optimal balance between sensitivity and specificity (Bjelland, Dahl, Haug, & Neckelmann, 2002). It is also common in the trauma literature and enabled comparison.

The AUDIT measure of alcohol misuse (Bush & Kivlahan, 1998) has the advantage of being sensitive to problematic alcohol use at the lower end of the spectrum. Harmful or hazardous habits are identified by scores above eight, and possible alcohol dependence by scores above 13 for women and 15 for men (Saunders et al., 1993). Due to small numbers in the sample, a threshold of all scores above 8 was used to identify any hazardous habits, regardless of severity.

The measure of past mental health (PMH) was scored as a binary outcome of any reported history of mental health problems, or none.

3.3.3.2 Relationship between acute stress and PTSD symptoms

The relationship between the ASDS and the PCL-S was tested to check the validity of treating them as a repeated measure assessing the same core symptoms. Acute stress was used largely to provide a comparison point for later stress reactions captured with the PCL-S. The role of ASD in predicting PTSD is much debated, and varies across populations, as discussed in section 1.2.1.1. It was thus important to assess the correlation between ASDS and PCL-S scores, and to understand the extent to which one predicted the other. Scores from three-month PCL-S were used, being closest in time to ASDS scores.

First, the raw numbers are presented in Table 10.

Table 10: Cross tabulation of ASDS (baseline) and PCL-S (three months): numbers of participants

Number		**PCL-S cut-off**	
		Low symptoms	High symptoms
ASDS cut-off	Low symptoms	63	14
	High symptoms	8	13

The numbers suggest that the ASDS and PCL-S showed consistency in identifying people with low symptoms (*N* = 63). There was less consistency in the identification of those with high symptoms on either measure.

The associations were tested in accordance with methods used in previous studies. Some of these were summarised earlier in Table 2, and Bryant's terms and definitions are used again here (Bryant, 2011). The relationship between ASD and PTSD is often stated as ASD being an effective screening tool for identifying subsequent PTSD. Analyses typically treat ASD as the screening tool, with subsequent PTSD as the 'true outcome'. Its effectiveness is measured using sensitivity, specificity and positive and negative predictive power. Sensitivity is the true positive rate: i.e. the proportion of people who met criteria for ASD and who went on to develop PTSS. Specificity is the true negative rate: i.e. the proportion of people who did not meet ASD criteria and did not develop PTSS. Positive predictive power is the proportion of people who develop PTSS and who also met criteria for ASD, and negative predictive power is those who did not meet criteria for PTSS or ASD. The proportions for this study, using three-month follow up data as the 'true status' are shown in Table 11.

Table 11: The relationship between ASDS (baseline) and PCL-S (three months)

	Proportion	[95% CI]
Sensitivity	0.48	[0.29,0.68]
Specificity	0.89	[0.79,0.95]
Positive predictive power	0.62	[0.38,0.82]
Negative predictive power	0.82	[0.71,0.90]

These proportions compare favourably with those summarised in Bryant's review (Bryant, 2011). Sensitivity and positive predictive power are both higher in this study than in the majority of studies reproduced from Bryant's review in Table 2. In terms of positive predictive power, Bryant suggests that if half of adults fall in this group, the fit is reasonable and this is the case in this study (62%). It was noted, however, that the confidence intervals for this study are wide.

As noted in the literature review, some research has found particular acute stress symptoms clusters to have a particularly strong role in predicting later PTSS. Associations in this study were tested: all baseline ASD clusters were strongly associated with PTSS at both follow-up waves. Re-experiencing, rather than dissociation, had the strongest association of all the clusters, but the overall ASDS score was most closely correlated with PTSS. These associations are presented in Appendix 9.5.

In summary, ASD symptoms predicted later PTSS at least as well in this study as in other comparable studies. The association between the ASDS and PCL-S indicated that it was acceptable and pragmatic to treat the two questionnaires as repeated measures. Dissociative symptoms did not appear to have a particularly strong role in predicting later PTSS in this sample. In the longitudinal analyses that follow, the ASDS and PCL-S are treated as measuring the same symptoms, though with clear caveats.

4 Prospective study results I: profiling the data

The characteristics of the wider clinical population are delineated to assess potential bias in recruitment.

This is followed by a detailed description of the study participants. Firstly, the clinical profile assesses the numbers achieved in the key groups of violent injury and facial injury, and describes other physical variables. Then the demographic profile of the sample is described. Finally, descriptive data on the study's psychological measures are presented.

4.1 Recruitment characteristics

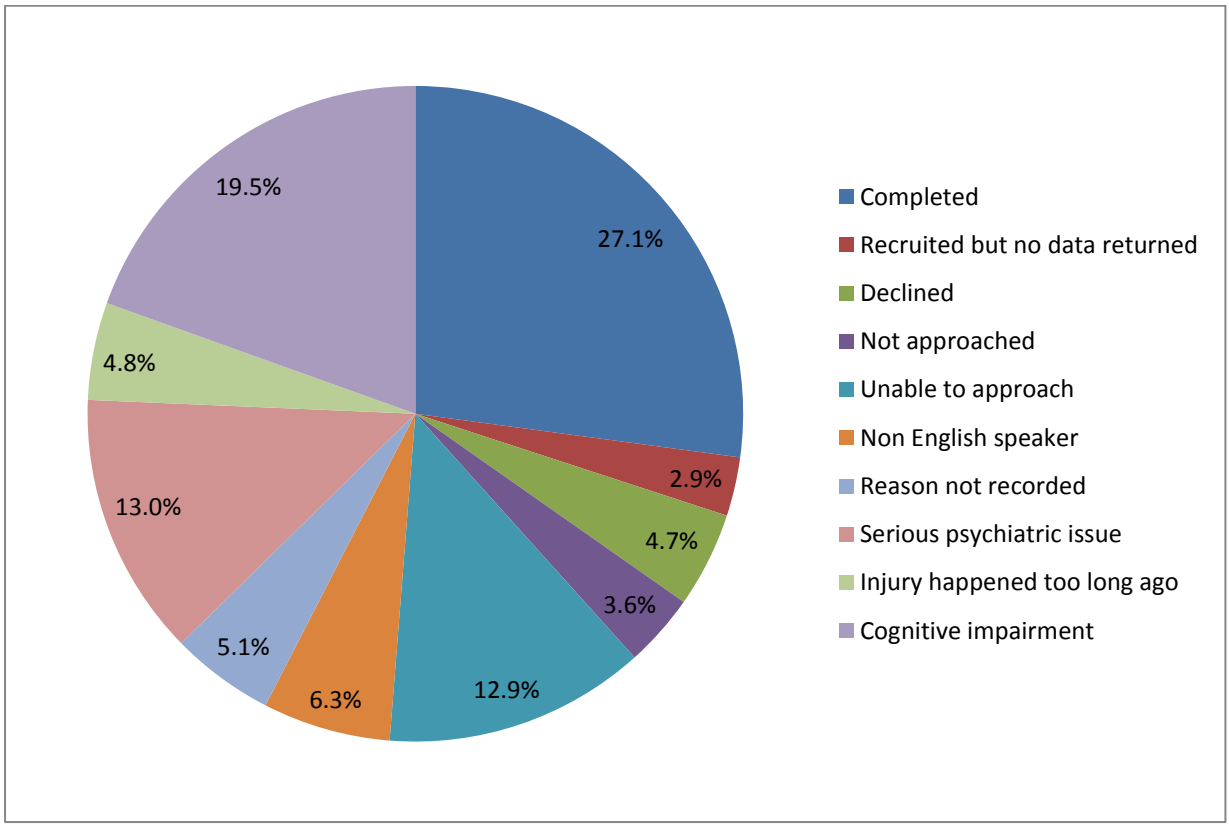
The study sample is examined, first in relation to all trauma patients on the wards during the study, and then in relation to the smaller proportion of patients who fulfilled study criteria.

Recruitment characteristics among the full clinical population

In this section, the full clinical population is considered, describing how many admitted patients were recruited, and the reasons for exclusion for those who were not recruited.

These data were collected from the clinical patient records, and document all patients treated by trauma or OMFS trauma teams on the days when recruitment took place. During fieldwork, it became clear that occasionally people admitted to the trauma centre were not patients who had sustained trauma, but hospital bed space could not be found for them elsewhere. They were excluded from the study, as were a small number of patients who were under 18. This left 829 people who were inpatients on the days when the study took place: recruitment and exclusion for them are displayed in Figure 3.

Figure 3: Recruitment and reasons for exclusion for the full clinical population (N = 829)



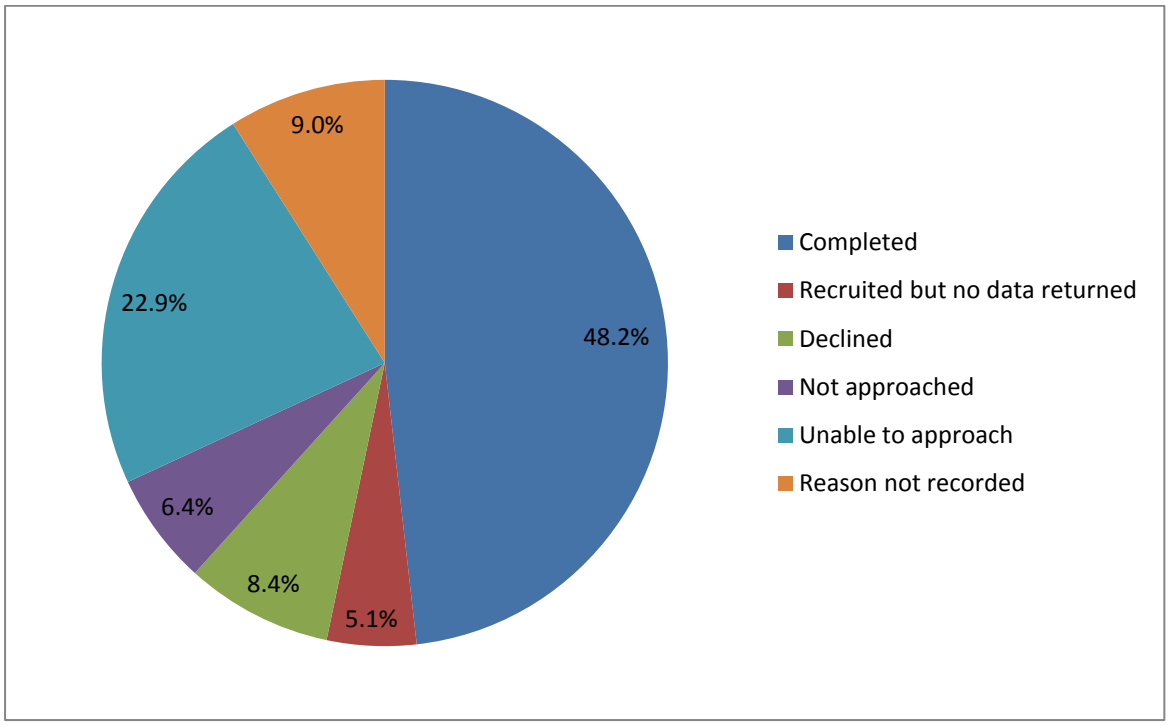
Five per cent (4.7%) of patients declined outright, whilst a further 2.9% consented but failed to complete questionnaires. Some (3.6%) were not approached because there was not enough time available on a given day. In 12.9% of cases, it was not possible to approach patients because they

were undergoing treatment such as surgery or physiotherapy; were isolated for infection; or were too nauseous, under the influence of alcohol, or excessively drowsy. In such cases, an attempt was made to approach these patients later; some were then recruited but others still could not be approached. Thirteen per cent (13%) of people were suffering from serious psychiatric conditions that excluded them from the study; this included those with active psychosis and those admitted after deliberate self-harm. Some patients (4.8%) had been in hospital for more than three weeks before being approached (for example, they may have been in ICU): these were excluded, as the time-sensitive baseline measures, such as ASDS, would not have been comparable. A large number (19.5%) experienced cognitive impairment, which meant informed consent could not be taken. This was principally due to recent head injuries, and in a few cases due to pre-existing conditions including dementia and learning impairment.

Recruitment characteristics among eligible patients

In total, 467 patients met the study criteria; the proportion that was recruited and reasons for exclusion are shown in Figure 4.

Figure 4: Recruitment and reasons for exclusion among all eligible participants (N = 467)



Among those who were eligible, almost half took part, while 13.5% either declined or failed to complete questionnaires. Among the remaining eligible patients, almost a quarter were missed because the researchers were unable to approach them, typically because they were undergoing medical procedures. Meanwhile 6% were missed because there was not time to approach them. Just

fewer than one in ten of all eligible patients were approached but declined to take part. Sensitivity analyses were carried out to check for possible bias.

4.1.1 Sensitivity analysis of recruitment

A number of analyses checked for significant differences between eligible patients who were not recruited. The only information available on patients who were not recruited was gender and age.

In order to test for associations, those who failed to return questionnaires were grouped with the 'Declined' category, and all remaining categories grouped into 'Unavailable for research'; these figures are given in Table 12.

Table 12: Grouped outcomes for all eligible trauma patients aged 18+

	N	(Column %)
Total	467	(100.00)
Recruited	225	(48.18)
Declined	63	(13.49)
Unavailable for research	179	(38.33)

These categories are used in the following section to explore differences in recruitment by gender and age, to check for possible bias.

Recruitment characteristics by gender and age

Table 13 presents gender and age differences among those who were recruited compared with those who declined or who were not approached. Age and gender details were not available for 41 people who had declined or who were unavailable, hence the smaller sample size.

Table 13: Recruitment characteristics by gender and age

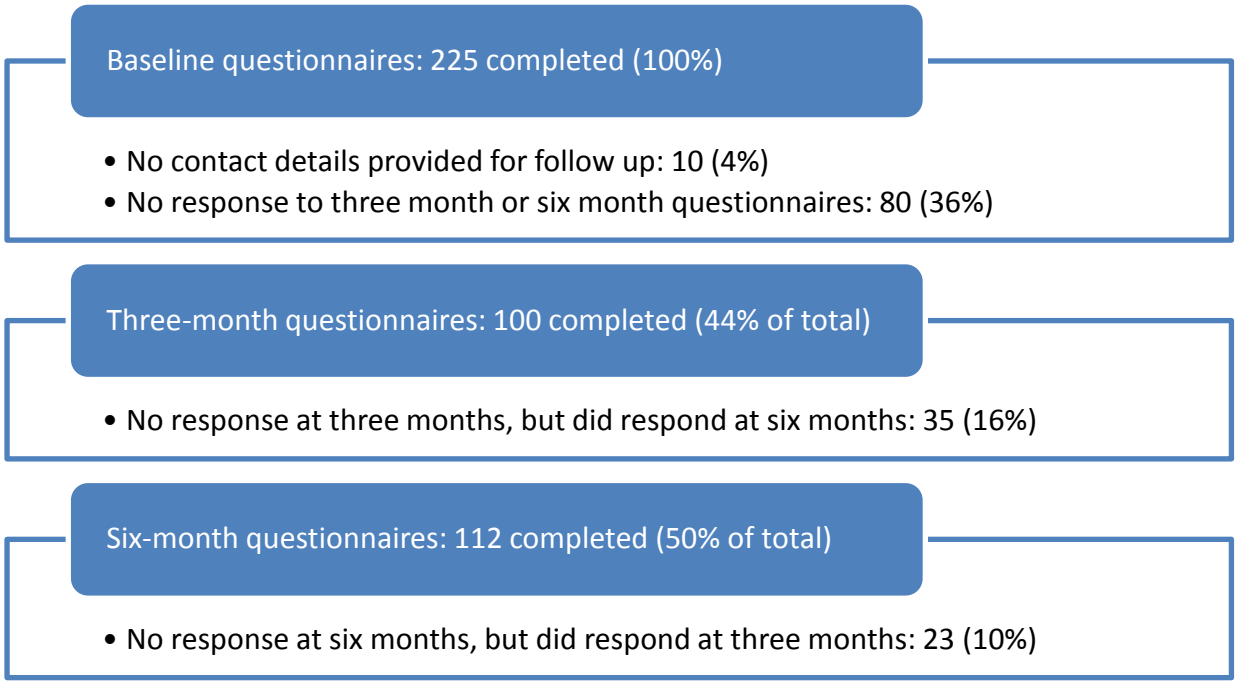
Variable	Values (n)	Recruited		Declined		Unavailable for research	
		N	(Col %)	N	(Col %)	N	(Col %)
Total	(426)	225	(100.00)	58	(100.00)	143	(100.00)
Gender	Male (336)	171	(76.00)	48	(82.76)	119	(83.22)
	Female (90)	54	(24.00)	10	(17.24)	24	(16.78)
Age	18-25 (123)	60	(26.67)	21	(36.21)	41	(28.67)
	26-35 (107)	59	(26.22)	17	(29.31)	32	(22.38)
	36-45 (64)	43	(19.11)	7	(12.07)	16	(11.19)
	46-65 (86)	45	(20.00)	9	(15.52)	30	(20.98)
	66+ (46)	18	(8.00)	4	(6.90)	24	(16.78)

Chi-square tests were performed to examine the relation between recruitment status and gender, and then recruitment status and age. Recruitment to the study did not differ by gender ($\chi^2(2, N = 426) = 4.06$, $p = .132$), or by age ($p = .099$).

4.1.2 Sensitivity analysis of participant response to follow up

At baseline, 225 patients were successfully recruited, i.e. they completed the measures of acute stress, depressive and anxiety symptoms, and basic demographic information. Completion rates for appearance concern and secondary questionnaires were lower. The number of patients who completed baseline questionnaires and followed up is shown graphically in Figure 5.

Figure 5: Diagram showing patient recruitment and retention at each stage



In total 60% of participants responded to at least one wave of follow up, with 44% of all baseline participants responding at three months and 50% at six months. There were unique responses at each wave of follow up, e.g. people who responded at three months but not at six months. Among the 40% who did not respond, ten people (4%) did not provide contact details at baseline. However, for all other non-responders, the reasons for loss to follow-up are not known; they simply failed to return questionnaires. Presumably some participants were simply disinclined, but based on information from clinical staff, several other factors are likely to have affected follow-up. In a number of cases, staff believed that patients were illiterate. Three participants were homeless and did not provide contact details. One participant was being discharged to prison, and this was a possibility for other participants. Because of stigma around such factors, they may have been more widespread than was evident.

Sensitivity analyses were carried out to assess bias in the sample at follow up. As the longitudinal analyses combine both waves, the sensitivity analyses presented here show *any* follow up, regardless of wave. However, the analyses are available separately for three-month and six-month waves in Appendix 9.2.

Differences in the follow-up rate by the two key exposures of violent injury and facial injury are presented in Table 14, along with differences on two measures of injury severity.

Table 14: Clinical and physical differences in follow up to either wave. *p<.05 **p<.01 ***p<.001

Variable (baseline n)	Values (baseline n)	% Response	OR	[95% CI]
Mechanism of injury (225)	Accidental (147)	68.03	1	
	Violent (78)	44.87	0.38***	[0.22,0.67]
Injury site (225)	No facial injury (101)	57.43	1	
	Facial injury (124)	62.10	1.21	[0.71,2.08]
Polytrauma (176)	No (118)	57.63	1	
	Yes (58)	68.97	1.63	[0.84,3.18]
Head injury (225)	No known HI (156)	55.77	1	
	Head injury (69)	69.57	1.81	[0.99,3.31]

Participants who had been injured through interpersonal violence were significantly less likely to respond to follow up questionnaires.

Table 15 assesses demographic differences in follow-up.

Table 15: Demographic differences in follow up to either wave. *p<.05 **p<.01 ***p<.001

Variable (baseline n)	Values (baseline n)	% Response	OR	[95% CI]
Gender (225)	Male (171)	57.89	1	
	Female (54)	66.67	1.45	[0.77,2.76]
Age (225)	18-25 (60)	43.33	1	
	26-35 (59)	57.63	1.78	[0.86,3.68]
	36-45 (43)	65.12	2.44*	[1.09,5.48]
	46-65 (45)	73.33	3.60**	[1.56,8.29]
	66+ (18)	77.78	4.58*	[1.35,15.55]
Ethnicity (225)	White, White British (166)	65.66	1	
	Black, Black British (26)	42.31	0.38*	[0.17,0.89]
	Asian, Asian British (17)	29.41	0.22**	[0.07,0.65]
	Mixed, Multiple, Other (16)	62.50	0.87	[0.30,2.52]
Religion (218)	No religion (80)	67.50	1	
	Christian (106)	61.32	0.76	[0.41,1.40]
	Other (32)	34.38	0.25**	[0.11,0.60]
First language (225)	English (173)	59.54	1	
	Other (52)	61.54	1.09	[0.58,2.05]
Birthplace (224)	UK (143)	58.74	1	
	Outside UK (81)	62.96	1.19	[0.68,2.09]
Parents' birthplace (221)	UK (108)	64.81	1	
	Outside UK (113)	56.64	0.71	[0.41,1.22]
Marital status (223)	Single (112)	53.57	1	
	Married or co-habiting (88)	68.18	1.86*	[1.04,3.32]
	No longer married (23)	65.22	1.62	[0.64,4.14]
Highest level of education (198)	GCSEs or none (74)	48.65	1	
	A level and above (124)	70.97	2.58**	[1.42,4.69]
Employment status (208)	Employed (138)	66.67	1	
	Student, homemaker (19)	47.37	0.45	[0.17,1.18]
	Unemployed (26)	42.31	0.37*	[0.16,0.86]
	Retired, sick (25)	72.00	1.29	[0.50,3.30]
Income (136)	Below minimum wage (42)	47.62	1	
	Below UK average (58)	68.97	2.44*	[1.07,5.56]
	Above UK average (36)	83.33	5.50**	[1.90,15.96]

There were significant demographic differences between those who did and did not respond to follow up. People in older age groups (aged 36 and above) were significantly more likely to respond, as were those who were married, with higher levels of education, or an income higher than the minimum wage. Meanwhile responses rates were significantly lower among people who identified as being Asian or Black, or identified with minority religions, with around a third of participants responding in the categories of 'other' religion and Asian ethnicity.

Response differences were also analysed based on participants' psychological distress and appearance concern at baseline, as show in Table 16.

Table 16: Differences in follow up to either wave by psychological distress. *p<.05 **p<.01 ***p<.001

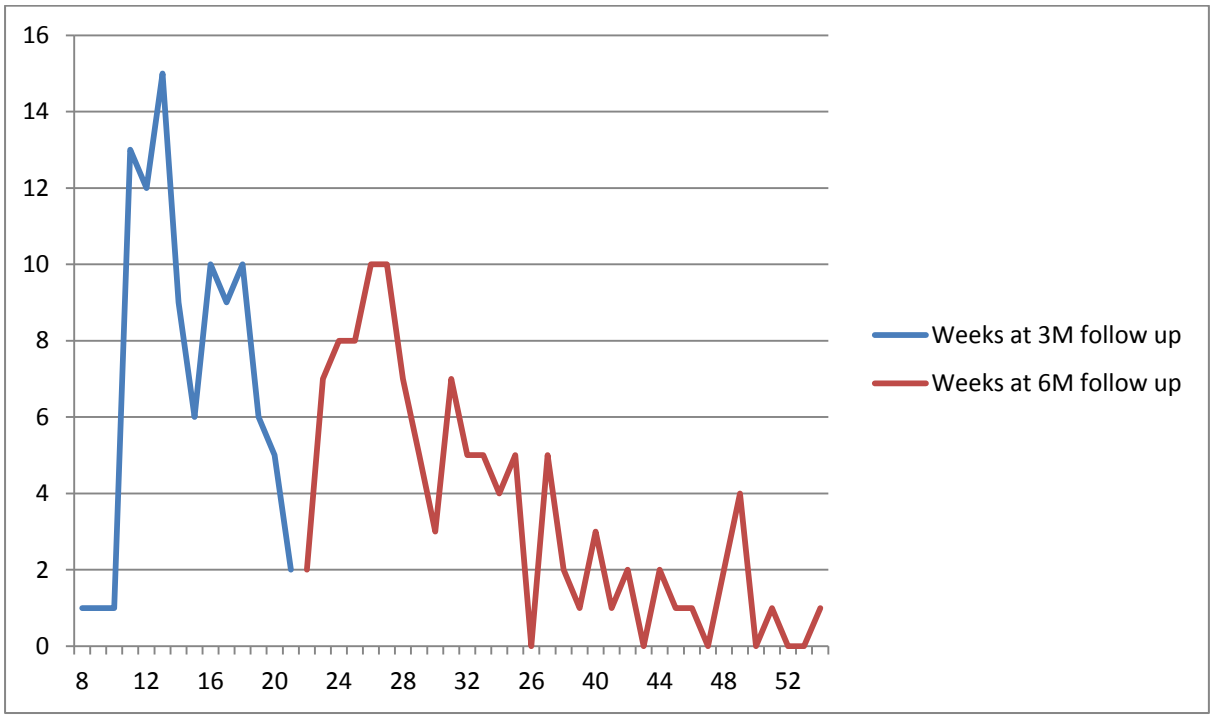
Variable (baseline n)	Values (baseline n)	% Response	OR	[95% CI]
Acute stress (221)	Low (159)	66.04	1	
	High (62)	45.16	0.42**	[0.23,0.77]
Depression (222)	Low (148)	68.24	1	
	High (74)	43.24	0.35***	[0.20,0.63]
Anxiety (224)	Low (129)	67.44	1	
	High (95)	50.53	0.49*	[0.29,0.85]
Appearance concern (196)	Lowest tertile (71)	70.42	1	
	Mid tertile (63)	68.25	0.90	[0.43,1.88]
	Upper tertile (62)	58.06	0.58	[0.28,1.19]

People with clinically significant symptoms of distress at baseline were significantly less likely to follow up. This was true for symptoms of acute stress, depressive and anxiety symptoms.

4.1.3 Timing of follow up

In this study, postal questionnaires were returned with widely varying timings, despite being sent out at the correct times. Some questionnaires were not filled in or returned by the participant until weeks or months later. Figure 6 illustrates this spread.

Figure 6: Frequency of follow-up questionnaires received each week from baseline



The scattered nature of timings is evident, however, it was not desirable to delete any responses. Two edits were made: two participants returned three-month questionnaires so late that they were treated as six-month questionnaires. Six-month questionnaires that were received late were retained as six-month questionnaires. When participants completed both follow-ups, responses were at least eight weeks apart, and on average 13.5 weeks apart.

Logistic regressions were performed to compare people who responded within an exact one-month period, and those who responded outside this time. These were carried out on key explanatory variables (injury site, injury mechanism), key outcomes (ASDS, HADS-A and HADS-D at baseline, and PCL-S, HADS-A and HADS-D at follow up) and key demographic variables (gender, age group, and ethnicity) to establish whether there were differences. This was repeated with three- and six-month responses. At three months, women were significantly more likely to respond outside the timeframe. There were no significant differences in the outcome variables.

As differences were minimal, I kept the three-month and six-month categories, with the two exceptions mentioned above. A time variable, 'days since event', was added to adjusted logistic regression models, in order to control for any differences.

4.1.4 Maximal inclusion of eligible participants

The sample included 34 participants who were unable to complete the questionnaires unaided. This was typically because of spinal restrictions that required them to remain flat in bed, because of arm or hand injuries, or because they did not have glasses or contact lenses with them in hospital. In these cases, I read the questionnaires aloud to patients, using the exact phrasing of the measures. There was a risk of bias since demand effects could arise, such as participants wishing to appear more satisfied to please the researcher, or alternatively wishing to highlight any dissatisfaction with care by overstating symptoms.

A sensitivity analysis was carried out, and there were some differences. The patients who were helped were significantly more likely to have facial injuries (*OR* 5.86, *CI* 2.18 to 15.78), head injuries (*OR* 4.14, *CI* 1.94 to 8.82) and to be aged 36 to 45 (*OR* 3.71, *CI* 1.06 to 12.97), relative to the youngest age group. However, there were no differences in outcome measures between those who had and had not received help. There was also no significant difference in their response rates at follow up.

4.2 Sample characteristics

4.2.1 Physical characteristics, including hypothesised predictor variables

Classifying site of injury

There were several possible ways of classifying injury. Participants could be grouped by the specialty through which they were recruited, i.e. major trauma or OMFS, but it was common for patients to appear on both lists, so grouping according to the area of the body affected was more useful. This led to two possible groupings:

1. Two groups:
    a. Any facial injury, whether or not the rest of the body was injured (55.11%);
    b. No facial injury (44.89%).
2. Three groups:
    a. Facial injury only (17.33%);
    b. Injuries to the face *and* the rest of the body (37.78%);
    c. No facial injury (44.89%).

To increase the power of analyses, the binary grouping of 'facial injury' versus 'no facial injury' was chosen, and is used in all the following analyses.

Exposure variables: mechanism and site of injury

Just over one third of participants had been injured by violent means, as shown in Table 17. In total, over half of the participants had a facial injury. Where data were available, one third were classified as having suffered 'polytrauma', i.e. multiple traumatic injuries. In total, one quarter of the sample were known to have suffered head injuries.

Table 17: Descriptives of physical variables

Variable	Values	N (Col %)	
Total		225	(100.00)
Mechanism of injury	Accidental	148	(65.78)
	Violent	77	(34.22)
Site of injury	No facial injury	101	(44.89)
	Facial injury	124	(55.11)
Polytrauma	No	118	(67.05)
	Yes	58	(32.95)
Head injury	No known HI	169	(75.11)
	Head injury	56	(24.89)

The nature of the injuries varied widely. Among the accidental injuries were relatively minor falls and more severe falls. Traffic-related accidents were common and included pedestrians, cyclists, motorcyclists, and drivers of cars and lorries. There were a number of work injuries related to industrial machinery, scaffolding or crush injuries. Animals had injured a small number of participants. A more detailed breakdown of accidental injury sites is provided below in Table 18.

Table 18: Breakdown of types of accidental injury

Accidental injury site	N	(Column %)
Fall	48	(32.43)
RTC (as pedestrian)	22	(14.86)
RTC (car, lorry)	21	(14.19)
RTC (motorbike)	17	(11.49)
Bicycle accident (no other vehicles involved)	12	(8.11)
RTC (bicycle)	12	(8.11)
Crushed at work	5	(3.38)
Accident involving animal (dog/horse)	4	(2.70)
Other accident (typically DIY or work)	4	(2.70)
Sports accident	3	(2.03)
Total	148	(100.00)

It was usually clear whether an injury was accidental or not: the only debatable cases were the three sports injuries, when injuries arose from physical contact with another person. In these cases, I asked participants whether they felt there had been any intention to harm them; each felt their injury was accidental.

Among the violent injuries were people injured in drink-related assaults, muggings, gang-related stabbings, and some very severe incidents such as assaults with hammers or cars-as-weapons. Due to their very varied nature, they are grouped at a broad level in Table 19.

Table 19: Breakdown of types of violent injury

Violent injury site	N	(Column %)
Assault	50	(64.94)
Assault involving stabbing	20	(25.97)
Domestic assault	4	(5.19)
Gunshot wound	3	(3.90)
Total	77	(100.00)

Further classification of violent injuries was limited, because patients' accounts were not always consistent with other reports of the circumstances of the injury. For example, the distinction between perpetrator and victim was often unclear, and in any case, a person could be both. Furthermore, it was estimated that between a third and half of violent injuries in this sample were related to street violence and gang activity. Again, it was not possible to classify this with certainty.

Mechanism and site of injury

Table 20 shows the overlap between mechanism and site of injury.

Table 20: Differences in mechanism of injury against other clinical and physical variables. N (Column %)

	No facial injury		Facial injury	
	N	Column %	N	Column %
Accidental	76	(75.25)	71	(57.26)
Violent	25	(24.75)	53	(42.74)
Total	101	(100)	124	(100)

Violent injuries were significantly more likely to affect the face ($\chi^2(1, N = 225) = 7.95$, $p = .005$). There was also a significant association between facial injury and head injury, which were often comorbid ($\chi^2(1, N = 225) = 30.42$, $p < .001$).

4.2.2 Demographic characteristics

The demographic profile of the baseline sample is shown in Table 21.

Table 21: Demographics for all participants at baseline

		N	(Column %)
Total		225	(100.00)
Gender	Male	171	(76.00)
	Female	54	(24.00)
Age	18-25	60	(26.67)
	26-35	59	(26.22)
	36-45	43	(19.11)
	46-65	45	(20.00)
	66+	18	(8.00)
Mean age	Mean (SD)	38.08	(16.05)
Ethnicity	White, White British	166	(73.78)
	Black, Black British	26	(11.56)
	Asian, Asian British	17	(7.56)
	Mixed, Multiple, Other	16	(7.11)
Religion	No religion	80	(36.70)
	Christian	106	(48.62)
	Muslim and other	32	(14.68)
First language	English	173	(76.89)
	Other language	52	(23.11)
Birthplace	UK	143	(63.84)
	Outside UK	81	(36.16)
Parents' birthplace	UK	108	(48.87)
	Outside UK	113	(51.13)
Marital status	Single	112	(50.22)
	Married or co-habiting	88	(39.46)
	No longer married	23	(10.31)
Highest level of education	GCSEs or none	74	(37.37)
	A level and above	124	(62.63)
Employment status	Employed	138	(66.35)
	Student, homemaker	20	(9.62)
	Unemployed	22	(10.58)
	Retired, sick	28	(13.46)
Income	Below minimum wage	42	(30.88)
	Below UK average	58	(42.65)
	Above UK average	36	(26.47)

The sample was predominantly male and relatively young with a mean age of 38. Almost three quarters of participants where white or white British, while 12% were Black or Black British, 7% Asian or Asian British and 7% belonged to mixed ethnic groups or other groups not specified. The sample included a range of religious backgrounds; participants responded to one of eight categories,

which were grouped into three. Almost half were Christian, more than a third stated they had 'no religion', and the remainder identified with another religion, the majority of these being Muslim (22 participants, 69%). There was a statistically significant association between religion and ethnicity ($p < .001$); people predominantly identified as white in the 'no religion' group (86%) and Christian group (80%), and as Asian or British Asian in the 'other' religion group (47%).

Just over three quarters of participants spoke English as their first language; by definition, all spoke English well enough to take part. Almost two thirds of participants had been born in the UK, leaving one third who were first generation migrants. Just over half of participants' parents had been born outside the UK.

In keeping with the young age profile, half the sample was single. Just less than four in ten were married or living with a partner (39%), while 10% were separated, divorced or widowed. Sixty-two per cent (62%) had qualifications at A level or above (or equivalent). Two thirds (66%) were in employment, either full time or part time, while 10% were students. Those who were unemployed constituted 11% of the sample, with the remaining 13% retired or unable to work due to sickness. Income, where stated, tended to be below average and 30% had an income below the minimum wage, however, 40% did not provide a response for income. People educated to A level or above had significantly higher incomes ($\chi^2(5, N = 128) = 8.38$, $p = .015$), and were significantly less likely to be unemployed ($\chi^2(7, N = 198) = 13.88$, $p = .003$).

Demographic differences by mechanism and site of injury

This section tabulates demographic variables by mechanism and then site of injury, so that demographic differences in these groups can be taken into account in the subsequent analyses.

Demographic differences between those injured violently and those injured accidentally are shown in Table 22.

Table 22: Demographics at baseline stratified by mechanism of injury. *p<.05 **p<.01 ***p<.001

Variable (baseline n)	Values (baseline n)	% Accidental	% Violent	OR on violence	[95% CI]
Gender (225)	Male (171)	60.23	39.77	1	
	Female (54)	81.48	18.52	0.34**	[0.16,0.73]
Age (225)	18-25 (60)	48.33	51.67	1	
	26-35 (59)	57.63	42.37	0.69	[0.33,1.42]
	36-45 (43)	62.79	37.21	0.55	[0.25,1.23]
	46-65 (45)	88.89	11.11	0.12***	[0.04,0.34]
	66+ (18)	94.44	5.56	0.06**	[0.01,0.44]
Ethnicity (225)	White, White British (166)	75.90	24.10	1	
	Black, Black British (26)	23.08	76.92	10.50***	[3.94,27.95]
	Asian, Asian British (17)	47.06	52.94	3.54*	[1.28,9.79]
	Mixed, Multiple, Other (16)	43.75	56.25	4.05**	[1.42,11.57]
Religion (218)	No religion (80)	68.75	31.25	1	
	Christian (106)	66.04	33.96	1.13	[0.61,2.10]
	Other (32)	46.88	53.13	2.49*	[1.08,5.78]
First language (225)	English (173)	66.47	33.53	1	
	Other (52)	61.54	38.46	1.24	[0.65,2.35]
Birthplace (224)	UK (143)	67.13	32.87	1	
	Outside UK (81)	61.73	38.27	1.27	[0.72,2.23]
Parents' birthplace (221)	UK (108)	76.85	23.15	1	
	Outside UK (113)	53.98	46.02	2.83***	[1.58,5.06]
Marital status (223)	Single (112)	50.89	49.11	1	
	Married or co-habiting (88)	79.55	20.45	0.27***	[0.14,0.50]
	No longer married (23)	82.61	17.39	0.22**	[0.07,0.68]
Highest level of education (198)	GCSEs or none (74)	59.46	40.54	1	
	A level and above (124)	70.97	29.03	0.6	[0.33,1.10]
Employment status (208)	Employed (138)	73.91	26.09	1	
	Student, homemaker (19)	52.63	47.37	2.55	[0.96,6.78]
	Unemployed (26)	23.08	76.92	9.44***	[3.52,25.37]
	Retired, sick (25)	80.00	20.00	0.71	[0.25,2.03]
Income (136)	Below minimum wage (42)	45.24	54.76	1	
	Below UK average (58)	81.03	18.97	0.19***	[0.08,0.47]
	Above UK average (36)	83.33	16.67	0.17***	[0.06,0.48]

There were marked differences in the demographic profile of those injured violently. The people significantly more likely to experience a violent injury were those who were male, single and in younger age groups, particularly those under 25. Participants from non-white ethnic groups were also more likely to have been injured violently with Black and Black British experiencing the highest prevalence of violent injuries, followed by the 'Mixed, Multiple, Other' group, and Asians and British

Asians. Those whose parents had been born outside the UK were more likely to have been injured through violence, although there was no significant evidence of differences among those who had been born outside the UK themselves. The prevalence of violent injury was also higher among those who were unemployed or in the lowest income bracket.

There was only one significant difference in demographic variables by site of injury. Unemployed participants were more likely to have a facial injury (*OR* 3.43, *CI* 1.22 to 9.62) than the employed reference group. Demographics at baseline stratified by injury site are presented in Table 72 in Appendix 9.6.

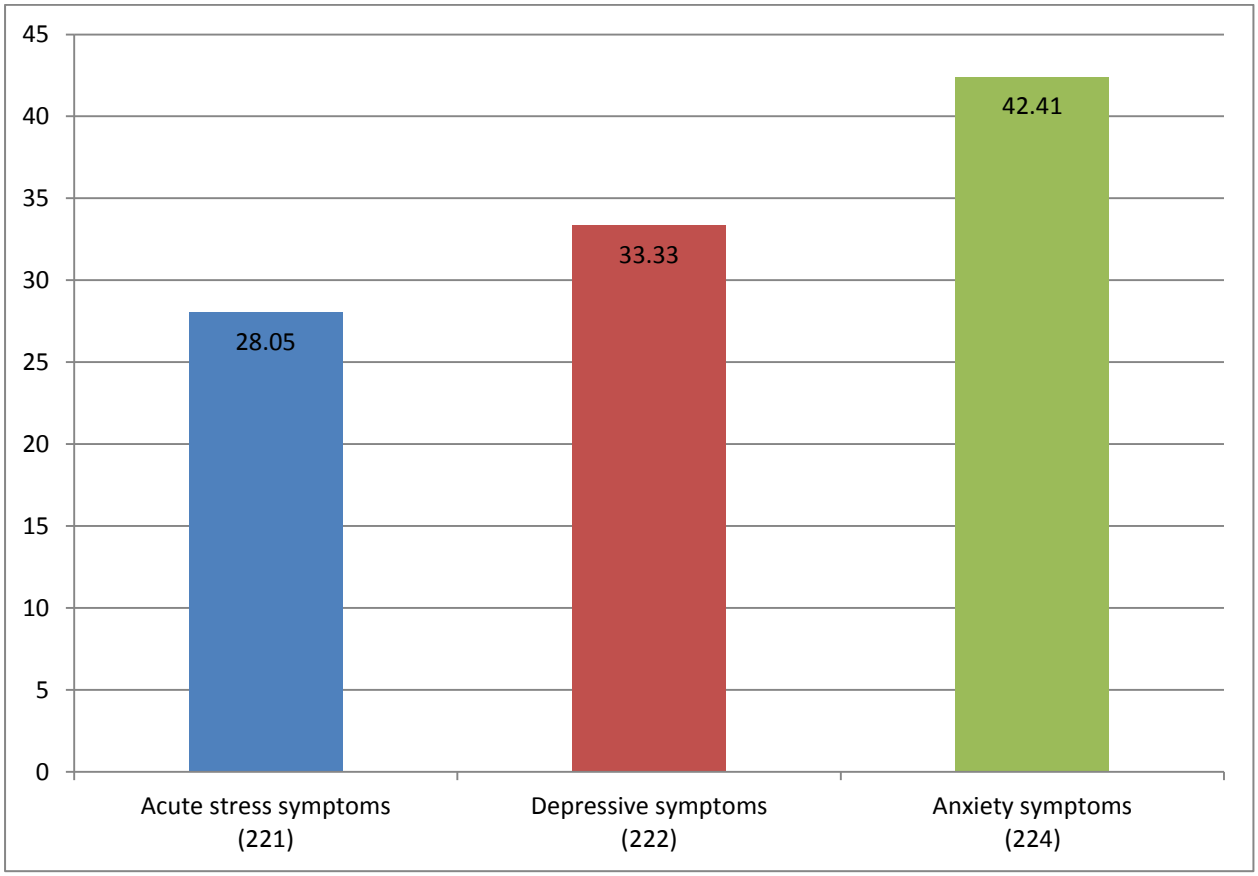
4.3 Psychological and psychosocial characteristics

In this section, descriptive statistics are presented for all the psychological and psychosocial measures used in the study. For the repeated measures, descriptives are provided for each wave; these provide the overall prevalence of distress on the outcome measures. A number of post-hoc tests of association were carried out to test for possible confounding; where these were significant, they are reported within the text.

4.3.1 Overall psychological distress at baseline

The prevalence of psychological distress was high on all three measures, as shown in Figure 7. The figure is based on the full baseline sample.

Figure 7: Baseline prevalence of psychological distress (ASDS ≥56, HADS-D ≥8, HADS-A ≥8). (N in brackets)

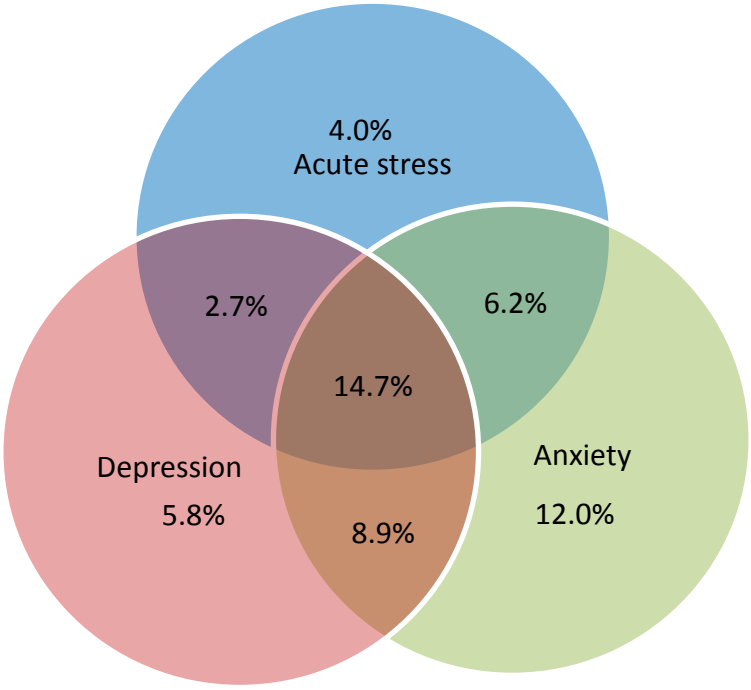


These prevalences show the proportion of participants with clinically significant symptoms, according to accepted thresholds. At baseline, over a quarter of participants had significant symptoms of acute stress; one third of depression; and four in ten of anxiety. Prevalence was

markedly higher than the general population for PTSS[1] and depressive symptoms[2], and somewhat higher for anxiety symptoms.

Comorbidity was high in the sample. Figure 8 graphically presents comorbidity, showing the percentage of participants who had significant symptoms of one condition alone, and the percentage whose symptoms overlapped with one or both other conditions.

Figure 8: Baseline comorbidity between psychological conditions (ASDS ≥56, HADS-D ≥8, HADS-A ≥8)



Most participants with psychological distress experienced symptoms on more than one outcome. One in seven experienced significant symptoms on all three outcomes.

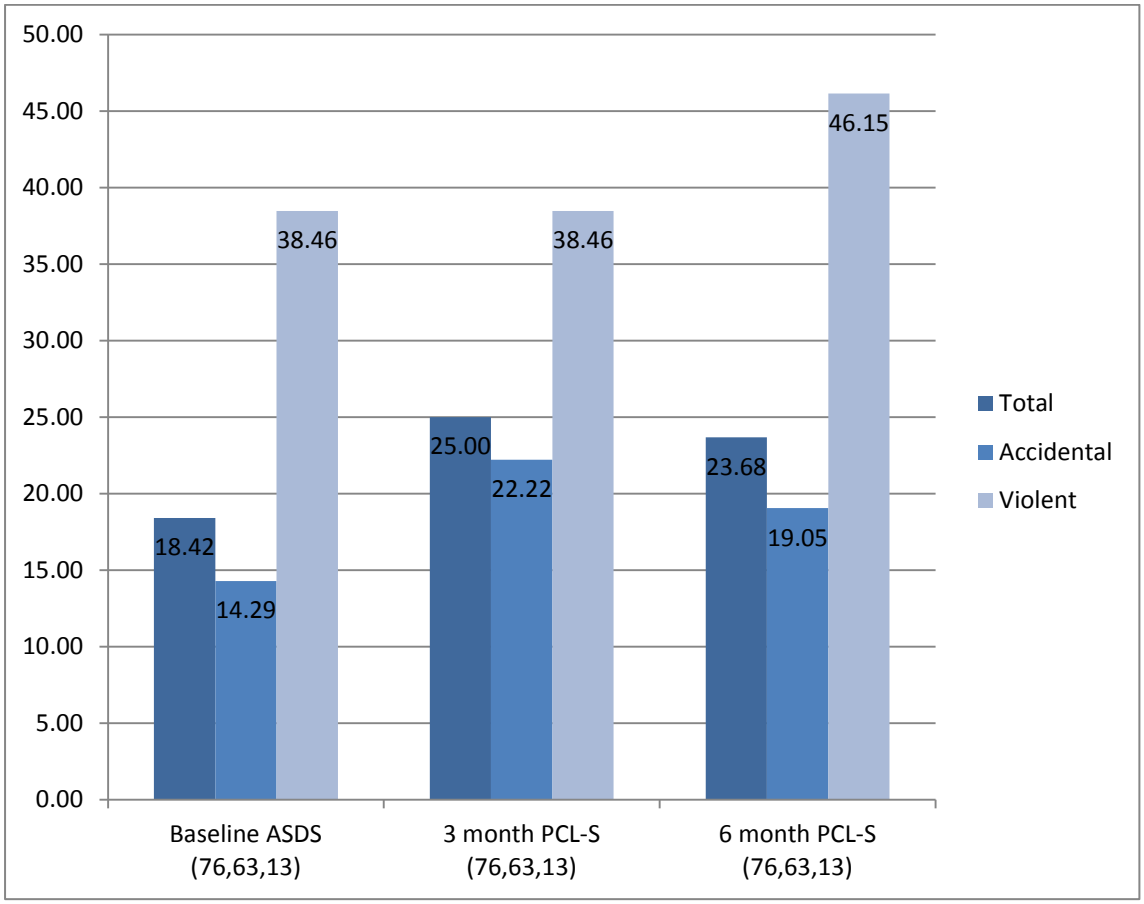
As seen in section 4.1.2, there were biases in the profile of participants who responded to follow up. The following sections on acute stress, depressive and anxiety symptoms therefore only present complete cases: the 77 participants who responded to all three waves. These prevalences were generally lower, which was likely to be due in part to the poor follow up from participants with high levels of baseline distress.

[1] General population data are not available for the PCL. However, the SELCoH study reported that 5.5% of the general population in South East London had current symptoms of PTSS (Frissa et al., 2013).
[2] The percentage of the general (non-clinical) population with clinically significant symptoms of depression is 11.4% (HADS-D ≥8); of anxiety 33.2% (Crawford & Henry, 2001).

4.3.2 Prevalence of PTSS (ASDS and PCL-S)

Based on complete cases only, the following two figures show the prevalence of clinically significant scores on the ASDS and PCL-S scales that reach levels indicative of a clinical diagnosis at each wave. Figure 9 includes the outcome stratified by violent and accidental injuries.

Figure 9: Prevalence of ASD and PTSD symptoms (ASDS ≥56, PCL-S ≥44) among complete cases: total and stratified by mechanism of injury. (N in brackets)

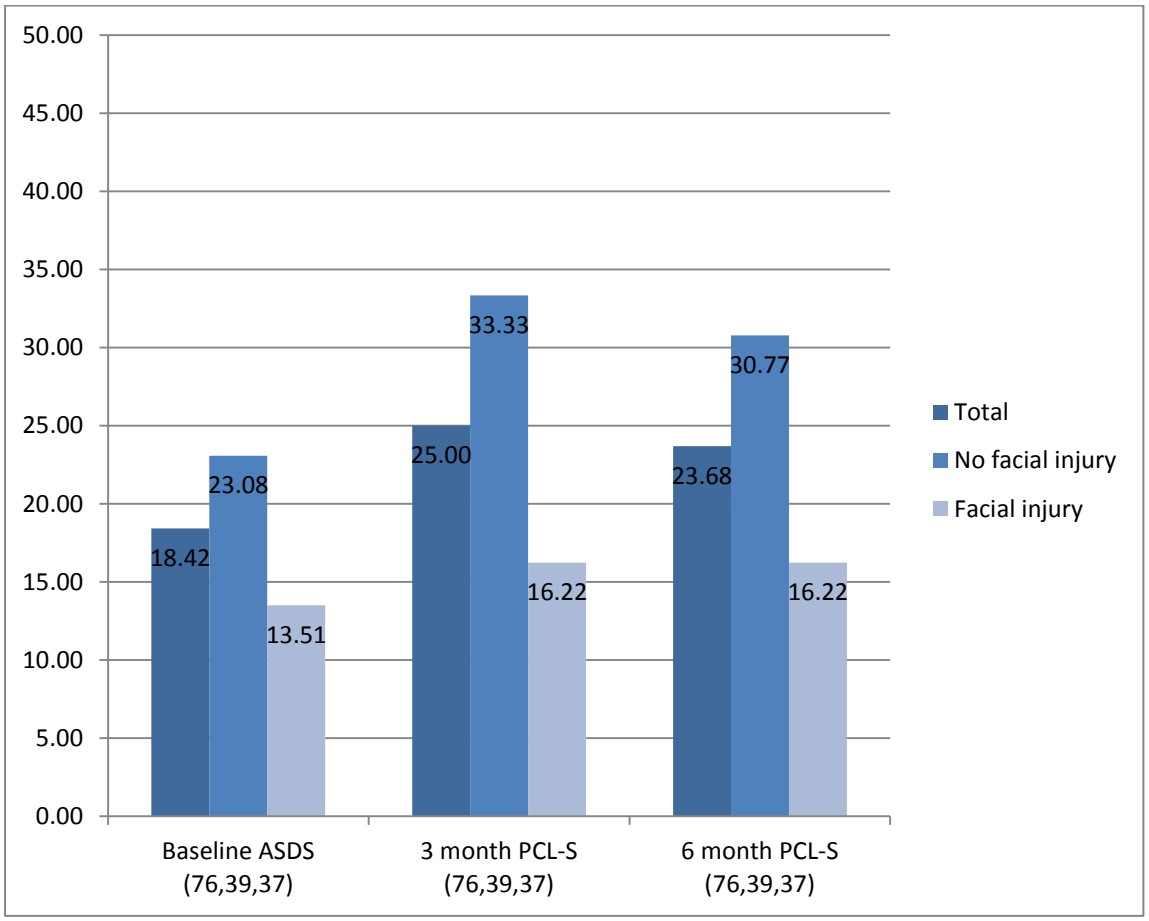


Among complete cases, baseline prevalence was somewhat lower than for the full sample. However, the prevalence was still high, with between a fifth and a quarter of participants experiencing significant symptoms. Acute stress was higher in the group injured through violence, with more than double the prevalence at baseline ($\chi^2(1, N = 76) = 4.19$, $p = .041$) and six months ($\chi^2(1, N = 76) = 4.38$, $p = .036$); a statistically significant difference at those two waves. However, this was based on a sample of 13 participants who were violently injured and who responded at all three waves; caution should be exercised.

Among all responders, rather than just complete cases, the prevalence at follow up was higher: in total 27% had significant symptoms at three months, and 27% at six months. Among all responders, the prevalence remained higher among people with violent injuries. This difference was significant at baseline ($\chi^2(1, N = 221) = 11.33$, $p = .001$) and six months ($\chi^2(1, N = 112) = 4.11$, $p = .043$).

Figure 10 shows the prevalence of clinically significant PTSS scores stratified by facial and non-facial injuries.

Figure 10: Prevalence of ASD and PTSD symptoms (ASDS ≥56, PCL-S ≥44) among complete cases: total and stratified by injury site. (N in brackets)

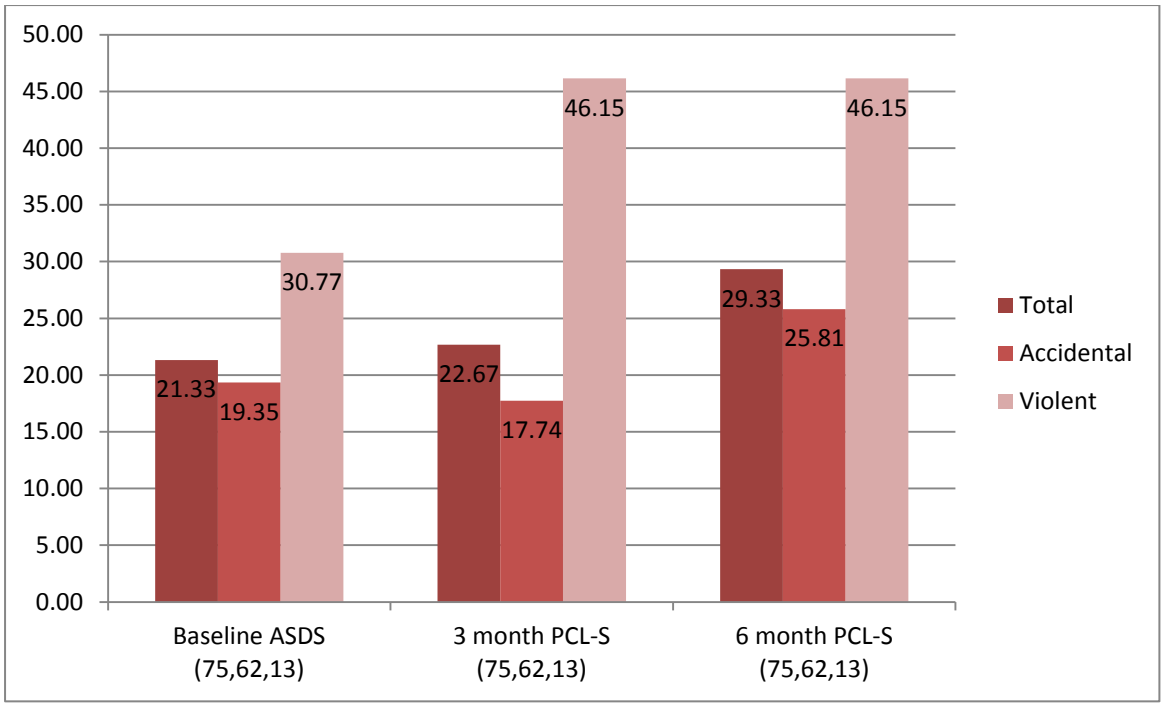


Although participants with no facial injuries had higher prevalence of acute stress at all waves, this difference was not statistically significant at any wave; nor was it significant among all responders.

4.3.3 Prevalence of depressive symptoms (HADS-D)

Figure 11 and Figure 12 show scores on the HADS-D indicative of a diagnosis of a depressive episode at each wave, among complete cases. In Figure 11, this is stratified by mechanism of injury.

Figure 11: Prevalence of depressive symptoms (HADS-D ≥8) among complete cases: total and stratified by mechanism of injury. (N in brackets)

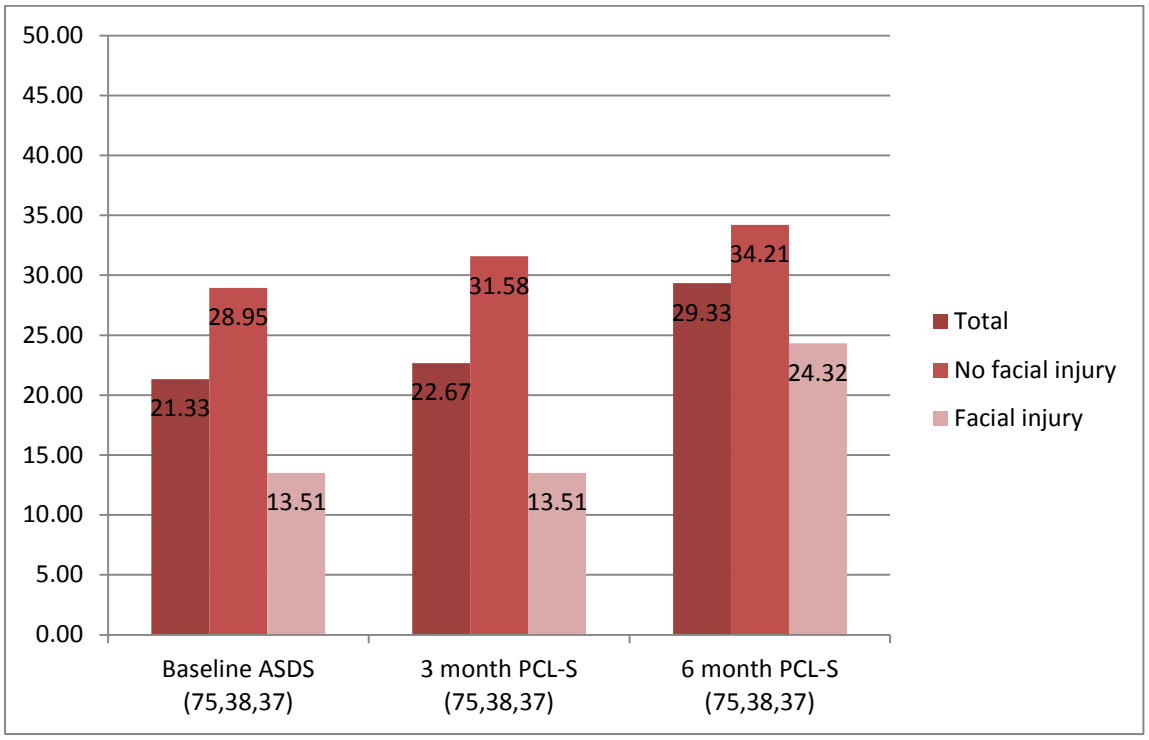


Overall, more than two in ten of the complete case participants had significant depressive symptoms at baseline, rising to almost three in ten at six months. Prevalence of depressive symptoms was markedly higher among participants injured though interpersonal violence; the difference was statistically significant at three months ($\chi^2(1, N = 75) = 4.95$, $p = .026$).

Among all responders, as opposed to just complete cases, 26% reported clinically significant symptoms at three months, and 31% at six months. Among this group, violent injuries had a higher prevalence of distress. This difference was statistically significant at baseline ($\chi^2(1, N = 222) = 6.21$, $p = .013$) and three months ($\chi^2(1, N = 100) = 5.61$, $p = .018$).

Figure 12 shows depressive symptoms stratified by injury site.

Figure 12: Prevalence of depressive symptoms (HADS-D ≥8) among complete cases: total and stratified by injury site. (N in brackets)

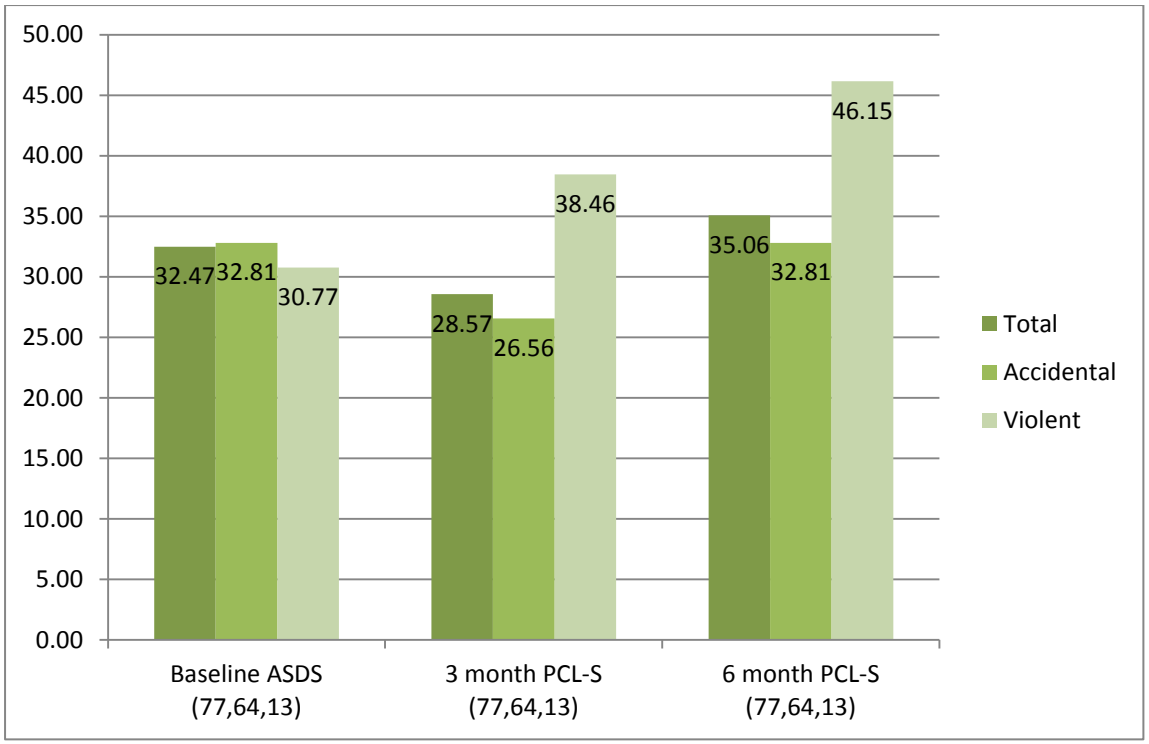


Participants without facial injuries had higher prevalence of depressive symptoms at each wave, but the differences were not statistically significant, either among complete cases or all responders.

4.3.4 Prevalence of anxiety symptoms (HADS-A)

Figure 13 shows the prevalence of anxiety symptoms among complete cases, and is stratified by mechanism of injury.

Figure 13: Prevalence of anxiety symptoms (HADS-A ≥8) among complete cases: total and stratified by mechanism of injury. (N in brackets)

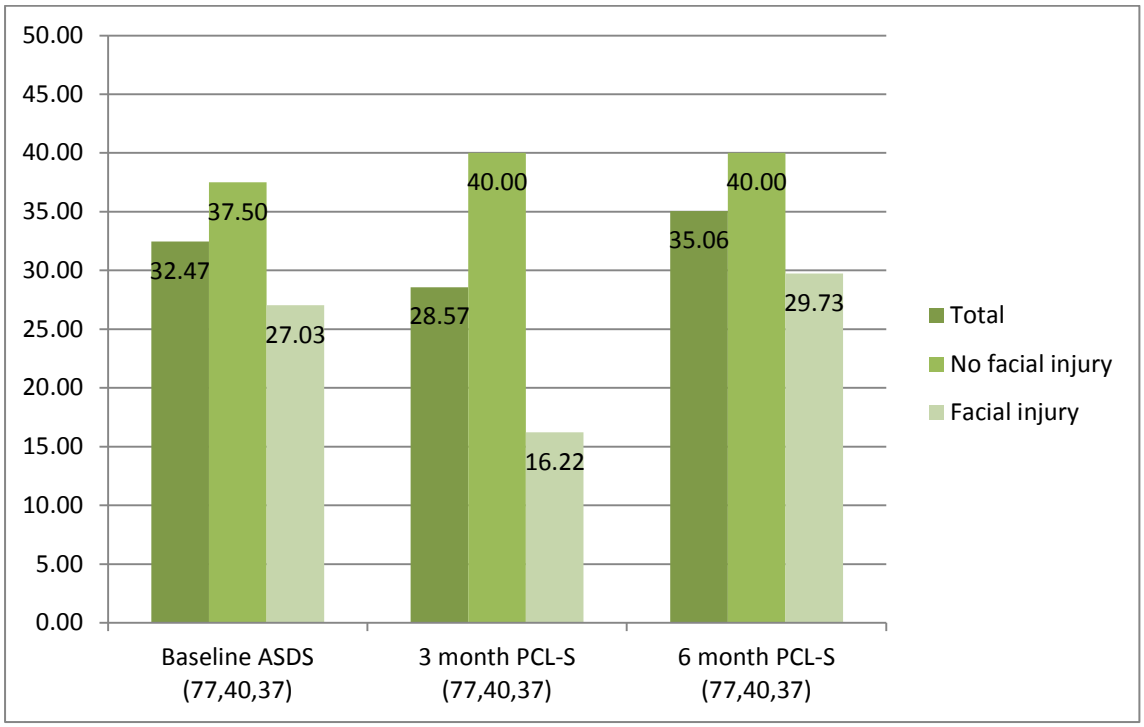


Around one third of complete case participants had clinically significant anxiety symptoms at baseline and six months. Prevalence was somewhat higher for those injured violently, but these differences were not statistically significant.

Among all responders, rather than just complete cases, 34% of participants had significant anxiety symptoms at three months, and 39% at six months. There were no significant differences by mechanism of injury.

Figure 14 shows the same data stratified by injury site.

Figure 14: Prevalence of anxiety symptoms (HADS-A ≥8) among complete cases: total and stratified by injury site. (N in brackets)



People with a facial injury had somewhat lower prevalence of anxiety than those with no facial injury, a difference that reached statistical significance at three months ($\chi^2(1, N = 77) = 5.33$, $p = .021$).

4.3.5 Appearance concern (DAS24)

The DAS24 first asks respondents "Is there any aspect of your appearance (however small) that concerns you at all?", although this question does not contribute to total scores. There was a significant difference in mean DAS scores between those answering 'Yes' and 'No' ($t(193) = 5.64$, $p < .001$): those professing no concern had lower DAS24 scores ($M = 28.92$, $SD = 1.10$) than those who were concerned ($M = 38.81$, $SD = 1.40$). However, a scatterplot showed more variation, including high DAS24 scores among those professing no concern. To retain this detail, all DAS24 scores are reported, not only those of people who stated they were concerned.

The questionnaire asks what aspect of appearance is of greatest concern, and these were not always related to the traumatic injury, as shown in Table 23.

Table 23: Aspect of appearance of most concern (DAS24). N (Col %)

Aspect of most concern	Baseline	Three months	Six months
Related to injury	60 (64.52)	40 (83.33)	41 (78.85)
Not related: weight	13 (13.98)	4 (8.33)	3 (5.77)
Not related: ageing, hair loss	10 (10.75)	2 (4.17)	3 (5.77)
Not related: skin/acne	5 (5.38)	1 (2.08)	3 (5.77)
Not related: other	5 (5.38)	1 (2.08)	2 (3.85)
Total	93 (100.00)	48 (100.00)	52 (100.00)

Areas of concern included weight, ageing and acne. The proportion of people whose main concern related to their injury increased from two thirds at baseline to around four out of five at follow up waves. The question is only asked of those who state they are concerned, hence the smaller sample.

Mean scores on appearance concern

Table 24 shows mean scores for appearance concern at each wave. It includes scores within mechanism and site of injury.

Table 24: Mean scores on Derriford Appearance Scale among complete cases: total and stratified by mechanism and site of injury

	Baseline			**Three months**			**Six months**		
	N	Mean	(SD)	N	Mean	(SD)	N	Mean	(SD)
Total	73	32.03	(12.30)	73	31.93	(15.66)	73	31.63	(15.21)
Accidental	60	31.62	(11.49)	60	30.48	(15.27)	60	30.24	(14.27)
Violent	13	34.00	(16.08)	13	38.77	(16.24)	13	38.23	(18.27)
No facial injury	36	34.59	(12.66)	36	33.95	(18.10)	36	33.13	(17.57)
Facial injury	37	29.32	(11.47)	37	29.92	(12.69)	37	30.00	(12.18)

At the overall level, there was little change in appearance concern over time, and mean scores were similar to those of the general population[3]. Mean scores were somewhat higher among people with

[3] For the general population, the DAS24 mean score is 30.99 (*SD* 13.88). Among those concerned about their appearance the mean is 39.39 (*SD* 13.40) and among those not concerned, 22.28 (*SD* 7.55) (Carr et al., 2005).

violent injuries, especially at three and six months; however, there were no statistically significant differences by mechanism or site of injury.

4.3.5.1 The disfigurement scale

Patients with a facial injury completed a disfigurement scale, as did the researcher; a smaller proportion of patients were given a disfigurement score by an OMF surgeon. Table 25 presents scores among all participants with a surgeon-rated disfigurement score.

Table 25: Mean disfigurement scale scores at baseline

	Mean	(SD)
Participant (44)	4.34	(2.76)
Surgeon (46)	2.46	(2.06)
Researcher (46)	3.09	(1.77)

Participants' scores were higher on average than those of surgeons or researchers. Patient and surgeon scores had a weak correlation that did not reach statistical significance ($r(42) = .29$, $p = .055$). There was also a weak, non-significant correlation between patient and researcher scores ($r(42) = .29$, $p = .058$). Surgeons' scores in this sample were lower than those in a head and neck cancer sample[4].

Participants also provided scores at follow up; these are presented for all complete cases in Table 26.

Table 26: Participants' mean disfigurement scale scores among complete cases: total and stratified by mechanism of injury

	Baseline			Three months			Six months		
	N	Mean	(SD)	N	Mean	(SD)	N	Mean	(SD)
Total	33	3.76	2.59	33	2.42	2.17	33	2.45	2.29
Accidental	24	3.54	2.62	24	2.00	1.91	24	2.04	1.94
Violent	9	4.33	2.55	9	3.56	2.51	9	3.56	2.88

Total scores decreased significantly from baseline to three months ($t(32) = 2.46$, $p = .001$). People injured violently had significantly higher scores than those injured accidentally at three months ($t(31) = -1.91$, $p = .033$) and six months ($t(31) = -1.74$, $p = .046$).

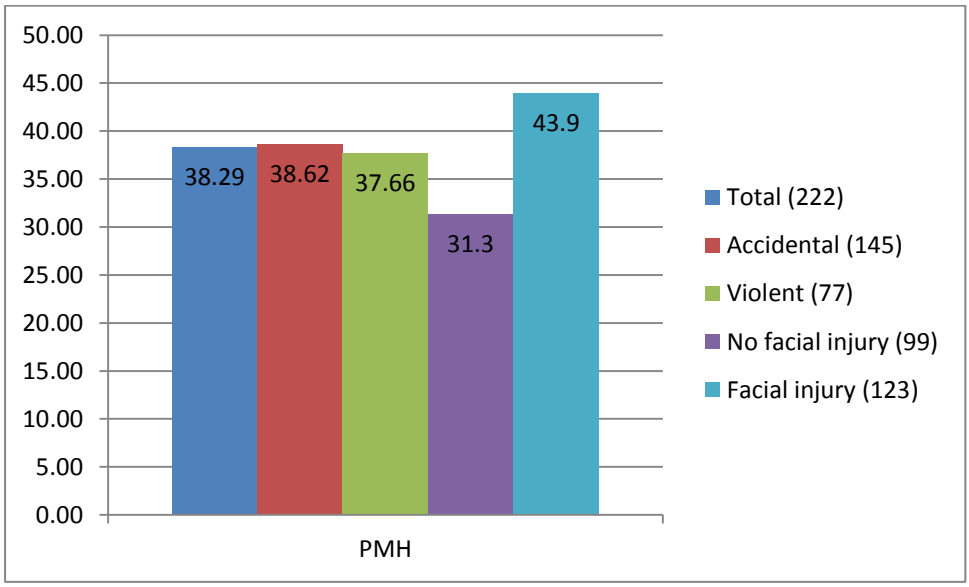
[4] In a sample of head and neck cancer patients, the mean surgeon score was 3.68 (95% *CI* 3.21–4.14)(Katz et al., 2000).

4.3.6 Prevalence of past mental health problems (PMH)

Among the 222 patients who completed the measure of past history of mental health problems, 33% reported a history of depression and 23% a history of anxiety. This gave a total of 38% with any past history.

Past mental health problems are shown in Table 27; this presents those with any history of mental health problems, stratified by mechanism and site of injury.

Table 27: Any history (PMH) – total and stratified by mechanism and site of injury

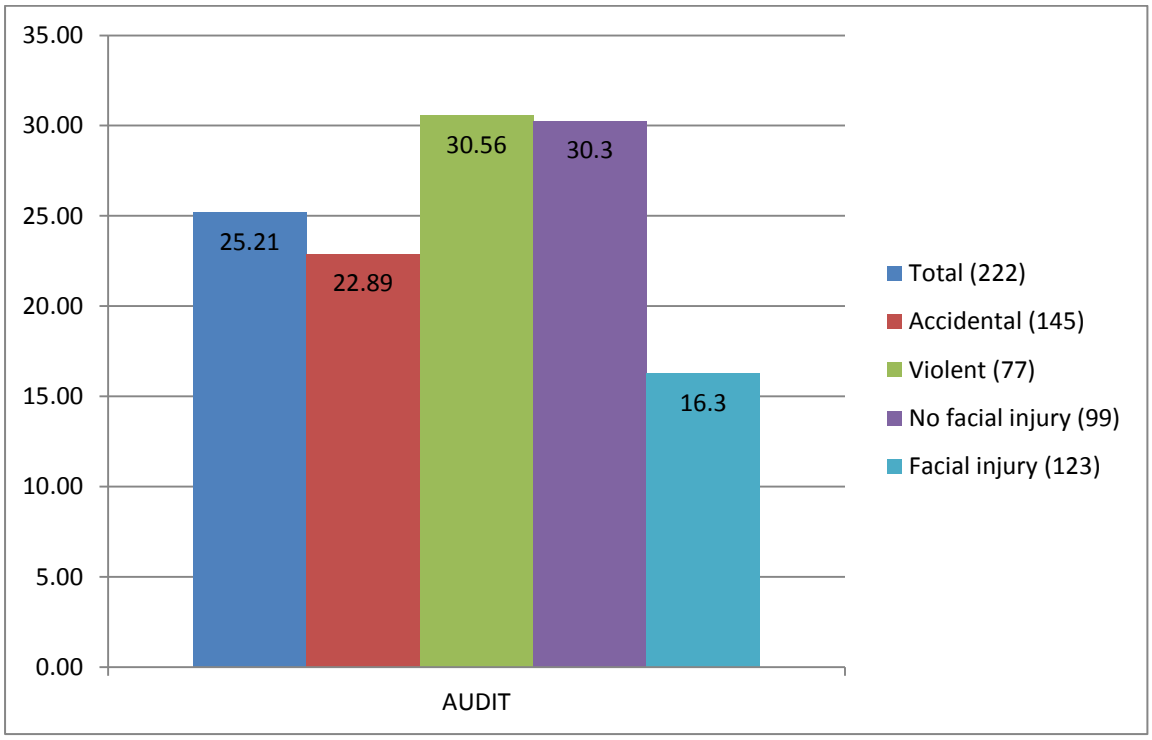


The prevalence was very similar across groups with different mechanisms of injury. Prevalence appeared somewhat higher among those with a facial injury, although this difference did not reach statistical significance. Women were significantly more likely to report past mental health disorders ($\chi^2(1, N = 75) = 11.04, p = .001$).

4.3.7 Prevalence of alcohol misuse (AUDIT)

The proportion of the sample whose alcohol consumption reached at least hazardous levels, and potentially included alcohol dependence, is shown in Figure 15.

Figure 15: Prevalence of hazardous alcohol use (AUDIT) at baseline: total and stratified by mechanism



Overall, one quarter of respondents had hazardous levels of alcohol consumption at baseline, rising to one third by six months. Although levels of hazardous use varied between groups, these differences were not statistically significant. Tests for confounding relationships revealed that there were no associations between hazardous consumption and either ethnicity, religion, employment status, income or education.

4.3.8 Wellbeing (WEMWBS)

Mean wellbeing scores on the WEMWBS are shown in Table 28, stratified by mechanism and site of injury.

Table 28: Mean scores on WEMWBS at baseline: total and stratified by mechanism

	N	Mean	(SD)
Total	173	47.35	(11.14)
Accidental	117	47.98	(10.71)
Violent	56	46.04	(11.98)
No facial injury	75	46.31	(10.36)
Facial injury	98	48.15	(11.69)

There were no statistically significant differences in wellbeing scores between the different groups. Scores were lower than those of the general population, but not markedly so[5].

4.3.9 Quality of life (WHOQOL)

The five domains of quality of life are presented with total scores and stratified by violence in Table 29.

Table 29: Mean scores on quality of life (WHOQOL) at baseline: total and stratified by mechanism. (N in brackets)

	Total (199)		Accidental (130)		Violent (69)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Physical	52.53	(16.81)	53.55	(16.40)	50.61	(17.50)
Psychological	58.54	(14.61)	59.48	(14.07)	56.75	(15.53)
Social	72.86	(20.23)	74.12	(18.80)	70.49	(22.64)
Environmental	66.55	(19.96)	69.98	(18.19)	60.09	(21.63)
Spiritual	58.98	(25.70)	59.71	(26.49)	57.61	(24.27)

Overall scores in this sample were relatively low on the physical, psychological and social domains, as compared to normative data from the general population[6]. However, environmental scores were comparable to those of the general population. Environmental scores among people injured violently were significantly lower than those of people injured accidentally ($t(197) = 3.41$, $p < .001$).

There were no significant differences in quality of life between those with and without facial injuries. These data are presented in Table 73 in Appendix 9.6.

4.3.10 Social support (CPQ)

Table 30 presents mean scores on the Close Persons Questionnaire domains of confiding and emotional support and practical support, which cover positive aspects of support, and negative aspects, which covers the sense of burden in close relationships.

[5] The mean score for the general population is 50.7 (CI 50.3 – 51.1) (Stewart-Brown, 2008).
[6] Mean scores for the general population are: physical domain 73.5 (SD 18.1), psychological 70.6 (SD 14.0), social 71.5 (SD 18.2) and environment 75.1 (SD 13.0) (Hawthorne et al., 2006). Population means not available for the spiritual domain.

Table 30: Mean scores on social support (CPQ): total and stratified by mechanism. (N in brackets)

	Total (173)		Accidental (116)		Violent (57)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Confiding support	15.97	(3.83)	15.93	(3.94)	16.05	(3.64)
Practical support	5.53	(2.68)	5.59	(2.57)	5.40	(2.90)
Negative aspects	3.09	(2.65)	2.81	(2.56)	3.67	(2.75)

Negative aspects of support were more evident among people injured violently, with significantly higher scores than those injured accidentally ($t(171) = -2.02$, $p = .023$).

There were no significant differences between facial and non-facial injury groups in perceived levels of support. These data are presented in Table 74 in Appendix 9.6.

4.3.11 Coping mechanisms (Brief COPE)

The different coping mechanisms are presented in Table 31, stratified by violent and accidental injury.

Table 31: Mean scores on use of coping mechanisms (Brief COPE): total and stratified by mechanism of injury. (N in brackets)

	Total (162)		Accidental (111)		Violent (51)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Acceptance	4.07	(1.68)	4.00	(1.63)	4.22	(1.77)
Active Coping	3.31	(1.86)	3.42	(1.82)	3.06	(1.95)
Behavioural Disengagement	0.86	(1.51)	0.69	(1.43)	1.22	(1.64)
Denial	1.35	(1.81)	1.22	(1.60)	1.63	(2.19)
Humour	2.54	(2.13)	2.70	(2.03)	2.18	(2.33)
Planning	3.13	(2.05)	3.14	(1.99)	3.10	(2.20)
Positive Reframing	2.75	(1.91)	2.68	(1.85)	2.92	(2.04)
Self-Distraction	2.34	(1.74)	2.28	(1.69)	2.47	(1.85)
Substance Use	0.71	(1.56)	0.60	(1.41)	0.94	(1.83)
Self-Blame	1.86	(1.73)	1.82	(1.69)	1.96	(1.84)
Using Emotional Support	3.86	(1.92)	4.00	(1.87)	3.55	(1.99)
Using Instrumental Support	2.80	(1.98)	2.83	(2.02)	2.75	(1.91)
Venting	1.65	(1.71)	1.42	(1.67)	2.16	(1.70)
Religion	1.42	(2.05)	1.24	(2.04)	1.80	(2.04)

The most commonly used coping mechanisms were acceptance, active coping, planning and using emotional support; all had mean scores above three, on a range from one to six. Three mechanisms were significantly associated with greater use among people injured violently. These were behavioural disengagement ($t(160) = -2.06$, $p = .020$), venting ($t(160) = -2.59$, $p = .005$) and religious coping ($t(160) = -1.62$, $p = .032$).

People with a facial injury ($M = 2.54$, $SD = 1.81$) were more likely to use self-distraction than those with no facial injury ($M = 2.07$, $SD = 1.62$). This difference was statistically significantly ($t(160) = -1.72$, $p = .043$). There were no other significant differences, and the data are presented in Table 75 in Appendix 9.6.

Religious coping was tested for an association with religion, in case of confounding. Religious coping most common among the 'other' religious group ($M = 2.71$, $SD = 2.15$), then among Christians ($M = 1.97$, $SD = 2.35$) and least common among those with no religion ($M = .6$, $SD = 1.27$). Both being Christian ($\beta = 1.37$, $p < .001$) and being in the 'other' religious group ($\beta = 2.11$, $p < .001$) were significantly associated with use of religious coping, compared with the 'no religion' group.

4.3.12 Childhood trauma (CTQ), measured at three months

The childhood trauma questionnaire provides five domains as well as a total score: these are presented in Table 32.

Table 32: Mean scores on childhood trauma (CTQ): total and stratified by mechanism of injury. (N in brackets)

	Total (116)		**Accidental (88)**		**Violent (28)**	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Physical Abuse	6.53	(3.24)	6.33	(3.20)	7.14	(3.33)
Emotional Abuse	7.14	(3.38)	7.09	(3.49)	7.29	(3.05)
Emotional Neglect	9.35	(4.91)	9.17	(5.00)	9.93	(4.65)
Physical Neglect	7.34	(3.11)	7.19	(2.88)	7.79	(3.76)
Sexual Abuse	5.49	(2.36)	5.42	(2.43)	5.71	(2.14)
Total score	35.84	(12.37)	35.20	(12.34)	37.86	(12.44)

Scores overall and within most domains fell within the range of scores for the general population[7], although those for emotional abuse and physical neglect were higher. Mean scores for physical

[7] Population means: Physical Abuse (M = 6-8), Emotional Abuse (M = 6-7), Emotional Neglect (M = 7-10), Physical Neglect (M = 6-7), Sexual Abuse (M = 5-9), Total score (M = 31-40), from (Bernstein, 2003; Scher, Stein, Asmundson, McCreary, & Forde, 2001).

abuse were significantly higher for people injured violently than those injured accidentally ($U(116)$, $z = -2.240$, $p = 0.025$).

There were no significant differences between the facial and non-facial groups; Table 76 presents these data and is included in Appendix 9.6.

Over half of participants (52%) had endorsed at least one of the three minimisation/denial items. These items highlight people who may be under-reporting childhood trauma, thus indicating that the present findings may be an underestimation of true levels of childhood trauma in the sample.

4.3.13 Traumatic life events (LTE), measured at three months

The numbers of traumatic events in the two key groupings are presented in Table 33. Recent life events were calculated to exclude the injury that led to hospital admission; therefore, it was possible for people to have no recent events.

Table 33: Mean and median scores on LTE, total and stratified by mechanism and site

	Mean	(SD)
Total (109)	1.32	1.72
Accidental (84)	1.19	1.61
Violent (25)	1.76	2.01
No facial injury (44)	1.27	1.56
Facial injury (65)	1.35	1.82

In total, the mean number of traumatic events was similar to that in a sample of primary care attendees[8]. The mean number of events was somewhat higher among people injured violently, although the difference did not reach significance ($t(1070) = -1.64$, $p = .052$).

[8] Among primary care attendees, the mean number of stressful events was 1.24 (SD 1.30); 65.2% reported one or more stressful events in the past six months (Motrico et al., 2013).

4.4 Results I discussion

4.4.1 Recruitment

The aim in the study was to include all patients who met the study criteria. In practice, however, it is seldom feasible to include every eligible person, and subgroups that are excluded need to be considered. Their exclusion can have an impact on research outcomes, and can lead to sampling bias. Bias can, in turn, lead to systematic error, and could therefore produce an incorrect estimate of an association. Understanding these biases allows careful interpretations of findings.

Those who consent to take part can be qualitatively different from those who decline. The reasons for exclusion may be relevant in themselves; for example, non-participants may be more likely to be disengaged. Non-participation could reflect a wider pattern of poor attendance at school, poor literacy, poor rate of return visits to hospital, and chaotic lifestyles. Therefore, they may be at high risk of psychological distress. Alternatively, they may not be experiencing problems and therefore be less interested in discussing issues.

In this study, there was likely to be a bias away from the most serious injuries: recruitment precluded people with serious head injuries and people in ICU (Intensive Care Unit) or HDU (High Dependency Unit), while those undergoing surgery or being treated by other specialist teams were more likely to be unavailable for research. However, those who were not approached because of insufficient time on the part of the researchers are believed to have been missed completely at random.

The exclusion of those who did not speak English merits discussion. Although it was planned, such people are likely to be excluded from most research, and are potentially at risk of social exclusion. Their exclusion also reduced the number of ethnic minority patients recruited. It is to be hoped that culturally and linguistically sensitive measures may be developed in future to enable a broader range of people to be included in research.

There were no significant differences in the age and gender profiles of people who were recruited to the study, compared with those who declined to take part or those who could not be approached for research.

Differences in follow-up rates are of potential concern. Among the 225 baseline participants, well over half (60%) were successfully followed up at least once. However, there were differences on several important variables. Of greatest concern was the fact that those with clinically significant symptoms of distress at baseline – whether of acute stress (*OR* 0.42, *CI* 0.23 to 0.77), depression (*OR*

0.35, *CI* 0.20 to 0.63) or anxiety (*OR* 0.49, *CI* 0.29 to 0.85) – were less likely to respond to follow up. It is therefore likely that prevalence estimates at follow-up are under-estimations. Those injured through violence were also significantly less likely to respond to follow up (*OR* 0.38, *CI* 0.22 to 0.67), and this group was already comparatively small. Previous research has reported that the distress of people injured violently is more likely to remain high over time, both in trauma and facial trauma patients (Johansen et al., 2006; Shepherd, Qureshi, et al., 1990). This could have led to an underestimation of distress at follow up in the present sample, compounding the effects of reduced follow up among those with distress. Being Black, Black British (*OR* 0.38, *CI* 0.17 to 0.89) or Asian or British Asian (*OR* 0.22, *CI* 0.07 to 0.65) was significantly associated with lower follow-up rates; these groups were small at baseline, so the reduced follow up is a considerable limitation. People in younger age groups were significantly less likely to follow up. Single people were less likely to follow up than those who were married or co-habiting (*OR* 1.86, *CI* 1.04 to 3.32). These limitations need to be borne in mind, both in the statistical analyses, and in the interpretation of results.

Follow up at the six-month wave (50%) was better than at three months (44%), as a result of the short questionnaires being sent out to people who had never responded. For this reason, it is also likely to be more representative. However, there were also unique participants at three months (i.e. people who did not respond at six months), so data analyses needed to account for these complexities.

The timing of follow up varied, with many questionnaires being returned outside the three month and six month time frames. The precise timing of follow-up is seldom discussed, but for postal follow-ups in particular, questionnaires are likely to be received over a period of weeks, if not months. This is exacerbated in populations with potentially chaotic lifestyles, for example in terms of alcohol consumption, involvement in street violence, or simply young people moving house often. The differences in response time in this sample were tested and there were no statistically significant differences in outcome measures. None the less, the longitudinal models were adjusted for a measure of 'days since event', to correct for any individual variation.

A strength of the study was the inclusion of an additional 34 people who could not complete questionnaires unaided because of physical impairments. It is acknowledged that not all questionnaires had been validated for use as interviews. However, the practice of reading questionnaires is not uncommon (Kendrick et al., 2011). In this study, participants who had been helped showed no significant differences in terms of likelihood to follow-up, or in terms of psychological distress.

4.4.2 Physical characteristics

The number of participants recruited at baseline was robust enough to test Hypotheses I and II. One third of the sample (77 participants, 34%) had been injured violently, and over half (124 participants, 55%) were being treated for facial injuries. There was an association between mechanism and site of injury, with violent injuries being significantly more likely to affect the face. This was consistent with findings from epidemiological studies (Conway et al., 2010; Shepherd, Shapland, et al., 1990). Predictably, those with facial injuries were significantly more likely to have sustained a head injury. One third of study participants (33%) were known to have experienced relatively severe injuries, which were classified as polytrauma, based on their ISS (Injury Severity Score). A quarter of participants (25%) had trauma consistent with a head injury, although all were sufficiently mild that participants' cognition was not affected.

4.4.3 Demographic characteristics

The sample was predominantly male, and at 76% the proportion of men closely replicated the finding in the national English trauma report that 75% of major trauma patients were male (NCEPOD, 2007). The mean age of 38.08 also reflected the mean age of 39.6 in the same report. The sample was reasonably representative of London's mixed ethnic population with three quarters being White or White British (74%), but with substantial representation of Black (12%) and Asian (8%) groups. The total numbers in each group (at baseline, 26 identified as Black or Black British and 17 as Asian or Asian British) were large enough to allow some analyses to be carried out, albeit with caveats. A substantial proportion of the sample was either born outside the UK themselves (one third), or had parents born outside the UK (half); a further reflection of London's diversity. A third of participants stated that they did not follow a particular religion, while almost half were Christian. In the Other religion group, the majority identified as Muslim; however, the sample size was insufficient to split Muslims out from other minority religious groups.

Half the sample was single, and almost two thirds were educated to A level (or equivalent) or higher. Two thirds were in employment, whether full time or part time, and one in ten was unemployed. Income was relatively low among those who stated it, with only a quarter earning over the average wage in Britain. The relatively high unemployment and low incomes in the sample show that at least some participants had low socioeconomic status. It has previously been suggested, although not clearly established, that injury is associated with socio-economic deprivation (Alexandrescu et al., 2009); there was some evidence for this in the present sample.

It is important to note that those who were injured violently had a very distinct demographic profile. Violent injuries were far more likely to be observed among participants who were: male; single; in younger age groups (particularly those under 25); Black or Black British, Asian or British Asian; with

parents born outside the UK; with no educational qualifications or none higher than GCSE; unemployed or in the lowest income bracket. It is worth observing that many of these factors are also associated with deprivation and social exclusion and may independently increase the risk of mental health disorders. Violent facial injuries have previously been reported to be more common among men who were socio-economically deprived (Conway et al., 2010), or who identified with ethnic minority groups (Allareddy et al., 2011; Lee, 2009), and there is some evidence of this among major trauma patients (Gerhart et al., 2003).

In this sample, there was evidence of a distinct sociodemographic profile among people with facial injuries. Being unemployed was significantly associated with injury site, being more common among those with facial injuries. A previous UK study reported that facial injuries were more common among unemployed people (Sen et al., 2001).

4.4.4 Prevalence of psychological distress

Over a quarter of participants (28%) experienced clinically significant levels of acute stress symptoms at baseline. This was considerably lower than the 43% who experienced significant symptoms in the pilot study of outpatients (section 2.2.2). Although it might be expected that people with less severe injuries would show lower levels of stress than those who sustain injuries requiring a hospital admission, it may be that patients perceive outpatient settings as being more stressful and uncertain compared to being in hospital and receiving treatment.

One third of participants (33%) had clinically significant depressive symptoms at baseline. Again, this was lower than the pilot study, where 42% had significant symptoms. In the general population, an estimated 11.4% of people experience symptoms at this level (Crawford & Henry, 2001), so the prevalence was markedly higher among this sample at each wave.

At 42%, the prevalence of anxiety symptoms was high, and was similar to that observed in the pilot study. Symptoms at this level affect 33.2% of the general population (Crawford & Henry, 2001), so although the prevalence was high in the sample, it was closer to the general population than the depressive symptoms or PTSS. This begs the question of whether one third of the normal population has clinically significant symptoms of anxiety, or whether, instead, the measure is overstating the prevalence, at least at this threshold. These potentially incongruously high rates are discussed in more detail below.

There was considerable comorbidity in symptoms of acute stress, depression and anxiety.

Appearance concern was not particularly high in the sample, with a mean baseline score of 32.03 (*SD* = 12.30) that mirrored that of the general population (*M* = 30.99, *SD* = 13.88), based on normative

data (Carr et al., 2005). Notably, one third of people who reported feeling concern were most worried about pre-existing aspects of their appearance, such as weight and ageing.

Evaluating the high prevalence of anxiety and depressive symptoms

The prevalence of distress in both the pilot and prospective studies was relatively high compared with previous studies, especially for anxiety and depressive symptoms. This could have been due to the use of a low threshold, and the HADS thresholds used in trauma studies vary considerably. However, the threshold of ≥8, used in the present study, has been widely used before and been reported to have good sensitivity for identifying psychiatric morbidity (O'Donnell, Creamer, et al., 2008; Schnyder et al., 2001; Sen et al., 2001).

On balance, the high prevalence in this study is consistent with that reported in similar studies. The pre-injury prevalence of distress in this population is likely to be higher than that of the general population. People who have been injured, accidentally or intentionally, have been reported to have higher rates of psychiatric disorders than the general population (O'Donnell et al., 2009). The same study also reported that people with existing mental health problems are more likely to experience traumatic injury. Moreover, mental health in the local population is likely to be poor compared with national levels. As discussed, the SELCoH study reported on mental health in South East London, a similarly deprived area. The study reported that 24% of their sample had common mental disorder: almost twice as high as national estimates for England (Hatch et al., 2012). This would be consistent with the high rates of anxiety and depressive symptoms seen in the present study.

However, a review of cancer patient research found that the anxiety domain of the HADS was less accurate than the depression domain as a screening tool for psychological disorders, and for diagnostic accuracy (Vodermaier & Millman, 2011). Therefore, depressive symptoms measured in the present study may be a more robust reflection of distress than anxiety symptoms.

4.4.5 Early evidence in support of Hypotheses I and II

There were indications that the data supported Hypothesis I, which stated that violent injury is associated with worse outcomes. The prevalence of acute stress symptoms was markedly higher in those injured through interpersonal violence; the difference was significant at baseline and at six months. The prevalence of depressive symptoms was also higher following violent injury, significantly so at three months. There was a tendency for higher appearance scores and levels of anxiety following violent injury, especially at follow up, but these differences were not significant.

There was no compelling evidence to support Hypothesis II, which stated that facial injuries are associated with worse psychological outcomes; in fact, there was some evidence for better

outcomes. The prevalence of psychological distress was lower among those with facial injuries, although there were no statistically significant differences. However, levels of appearance concern were significantly lower among people with facial injuries at baseline.

4.4.6 Role of explanatory variables

These explanatory measures were hypothesised to be associated with psychological outcomes. Here, the prevalences are discussed where applicable, as well as any group differences that could confound subsequent associations with the outcomes.

Alcohol misuse (AUDIT)

One quarter of participants reported hazardous levels of alcohol consumption at baseline. Although alcohol consumption is often implicated in the aetiology of injury, there was no significant association with either the mechanism or site of injury. The SELCoH study reported that hazardous alcohol consumption was associated with higher socio-economic status and was more common among people of white British ethnicity compared with other ethnic groups, with the exception of Asian groups (Hatch et al., 2011). However, such patterns were not apparent in the present study.

Wellbeing and quality of life (WEMWBS and WHOQOL)

Wellbeing was relatively high in this sample, in as much as levels were only slightly lower than the general population mean, despite the high levels of distress in the sample. The study mean was 47.35 (*SD* = 11.14) compared with the population mean of 50.7 (CI 50.3 to 51.1) (Stewart-Brown, 2008). It may have been too soon after injury for people's sense of wellbeing to have been affected. Alternatively, the wellbeing measure may lack sensitivity in this population. The findings suggest wellbeing may not be associated with psychological distress, and this is explored in the following chapter.

In contrast, psychological quality of life was considerably lower, with a mean of 58.35 (*SD* = 14.58) compared with a population mean of 70.6 (SD = 14.0). Physical quality of life was also low among trauma patients, which one would expect when most have experienced at least temporary impediments to their physical health. The sample therefore endorsed items relating to physical pain and the need for "medical treatment to function in your daily life". The mean score of 51.23 (*SD* = 16.06) was lower than the general population mean of 73.5 (*SD* = 18.1) (Hawthorne, Herrman, & Murphy, 2006).

Social quality of life, which includes items on personal relationships and support from friends, was comparable to the general population. Environmental questions around satisfaction with living place and feeling safe in daily life had a lower score (*M* = 65.64, *SD* = 18.76) than the general population

(*M* = 75.1, *SD* = 13.0). People are likely to feel less safe after an accident or violent attack. Furthermore, environmental quality of life was significantly lower for people injured violently. This could reflect an aspect of deprivation, in relatively poor standards of living at home. Indeed, "future concerns of safety" emerged as a theme in the vignette analysis, and noted participants' fears about going home. One man who had been attacked believed he could not "… go back to the old house, does not feel safe", while another young man was "scared of it happening again. They know his house; someone (them) tried to burgle it the next day […] scared of being in that house" (Skinner, 2014). These accounts augment the quantitative findings.

Close persons questionnaire (CPQ)

There were no significant differences in positive social support by group. However, the vignette analysis highlighted the importance of family relationships, which were perceived as a source of protection and associated with positive thoughts about the future. Participants discussed their living arrangements when they left hospital; for example, some planned to stay temporarily with parents or other family members while they recovered, and described being looked after. One young man gave an account of the way his friends looked after him when he was injured, and wrapped him up (Skinner, 2014). There was also evidence of people who were worried about their families; this could reflect the negative aspects of social support captured in the CPQ. There was evidence of higher negative social support following violence.

Childhood trauma

The prevalence of childhood trauma in this sample was comparable to that in the general population. There was evidence that people who had been injured violently had experienced significantly higher levels of physical abuse in childhood. This could indicate a lifelong pattern of vulnerability to violence. An Australian study reported that people who had been injured had significantly higher levels of prior traumatic events including childhood abuse. One of the mechanisms they propose is that those who have been abused as children may have poor risk assessment skills in adult life, which is a possibility in the present sample (O'Donnell et al., 2009). In the vignettes, a young man who had been assaulted said that his parents had beaten him as a child. He believed this had done him good, and that it had prevented him being 'soft': this hints at the cyclical nature of violence.

It is worth noting that half of participants endorsed the minimising items, which suggests they may have been downplaying negative memories. It is possible, therefore, that levels of childhood trauma were higher than was reported in the data. However, a recent article questioned the utility of the

minimisation scale. After noting that it is widely ignored anyway, the analysis demonstrated that the minimisation scale did not moderate relationships between clinical diagnoses and other scores on the CTQ. The researchers concluded there was little justification for using the minimisation scale (MacDonald, Thomas, MacDonald, & Sciolla, 2015).

Two limitations in this measure were notable; firstly, the measure of emotional neglect needed to be treated with caution due to an item being excluded from the paper questionnaire (see section 9.4.1). Secondly, participants completed this questionnaire at three months and responses could have been subject to recall bias; for example, those with higher distress may overemphasise negative memories.

Coping mechanisms

Behavioural disengagement was significantly more common among people injured violently. This echoed a suggestion from Coid et al that violent behaviour was a displacement activity to minimise the effects of a negative environment on self-esteem (Coid et al., 2013). The present finding supported the idea. Of course, people injured violently have not necessarily engaged in violence themselves, but as discussed, the distinction between victim and perpetrator is often unclear. Venting was also more common among people injured violently: a plausible reason would be that a tendency to vent would lead to escalating tensions. Venting includes items like "I've been saying things to let my unpleasant feelings escape" which could be understood as aggressive expressions. Venting might provoke physical aggression in others; equally, people who vent their emotions verbally might eventually resort to a physical outlet and commit violent acts themselves. Religious coping was also associated with violent injury; although reasons were not obvious, violence was more likely to affect people who identified with minority religions. This is discussed in more detail in section 5.6.4.

Disfigurement scores

The relationship between objective and subjective disfigurement scores was interesting. At baseline, there was no association between surgeon (objective) and patient (subjective) disfigurement scores. This concurred with extensive previous literature (Brown et al., 2010; Levine et al., 2005; Moss, 2005). However, there was an association between patients' later scores and the baseline scores of surgeons. The plausible explanation for this is that surgeons' ratings are based on what they foresee to be the long-term outcome, whereas patients' ratings, understandably, are based on their current evaluation. At follow up, the patient may be more educated about realistic expectations, and may be seeing improvement. The researcher disfigurement scores, gathered at baseline as a lay score, were

associated with patients' baseline ratings, but not with subsequent ratings. Like patient scores, these were based on a current evaluation.

Patients' disfigurement ratings were associated with their appearance concern measured at the same time, and the association was particularly strong at six months. This was useful as it showed that the subjective perception of disfigurement is associated with distress about appearance.

List of threatening experiences (LTE)

The number of traumatic experiences reported was higher among people injured violently (mean number of events = 1.76, *SD* = 2.01), compared with those injured in accidents (*M* = 1.19, *SD* = 1.61), but this difference did not reach clinical significance. Therefore, there was no compelling evidence of a trauma-dense environment for people injured violently, as has been suggested in the past (Stephens et al., 2010). The fact that the measure was administered at three months meant some people injured violently had already been lost to follow-up, and it is therefore likely that the measure provides an incomplete picture. However, previous research has reported that people admitted to hospital with injuries have higher rates of traumatic life events than the general population, regardless of whether their injuries were caused accidentally or violently (Zatzick & Kang, 2002), which may explain the lack of association here. For people injured in accidents, the mean number of events was similar to that of a primary care sample (*M* = 1.24, *SD* = 1.30) (Motrico et al., 2013).

4.5 Key findings

Prevalence and Hypotheses I and II

- The prevalence of PTSS and depressive and anxiety symptoms was high. However, appearance concern was not particularly high.
- There was evidence to support Hypothesis I. People who had been violently injured had significantly higher symptoms of PTSD (at baseline and six months) and depression (at three months).
- Hypotheses II, which stated that those with facial injuries would have worse outcomes, did not appear to be supported.

Recruitment and follow up

- There were significant differences in follow up that were potentially problematic. Follow-up was significantly lower among people with high levels of baseline psychological distress, people injured violently, and people identifying with ethnic minority groups. Multilevel modelling will minimise the detrimental effects of this bias.

Physical and demographic characteristics

- The sample was predominantly male, relatively young and ethnically diverse.
- Violent injuries were significantly more likely to affect the face, in keeping with epidemiological evidence.
- Violent injuries were significantly more common among certain groups. These were young men, ethnic minority groups, and groups with low socio-economic status, based on their education, income and employment status.

5 Prospective study results II: cross-sectional baseline analyses

These initial analyses begin to test the study's hypotheses. Psychological outcomes were predicted to be worse following i) violent injury and ii) facial injury, and iii) explanatory psychosocial variables were predicted to affect outcomes.

Each of the outcomes (PTSS, depressive and anxiety symptoms and appearance concern) is dealt with in turn. For each, I characterise a) physical, b) demographic and c) psychological and social factors that are associated with it. These univariate analyses examine the baseline data cross-sectionally.

5.1 Univariate associations of psychological measures

Each of the following sections deals with one psychological outcome. Each section presents univariate associations between the psychological outcome and:

1. Physical variables – these include the key predictors of mechanism and site of injury;
2. Demographic variables;
3. Other psychological outcomes and the psychosocial explanatory variables.

Among the physical variables, violent injury and facial injury are predicted to be associated with worse psychological outcomes.

The psychological and psychosocial variables are reported in three sequences. The first encompasses those factors that can be dichotomised into the presence or absence of illness, i.e. acute stress, depressive and anxiety symptoms, past history of mental health problems, and alcohol misuse. For each of these variables, the presence of significant symptoms is hypothesised to be associated with worse outcomes. The severity of symptoms is described as 'high' and 'low': high symptoms are clinically significant symptoms. It also includes appearance concern, split into tertiles.

The second includes explanatory variables with continuous scores, comprising wellbeing, quality of life, social support, childhood trauma, and disfigurement scores. High scores on wellbeing and quality of life are positive, and are hypothesised to be associated with better psychological outcomes. Social support encompasses two positive domains, which are practical support and confiding or emotional support, and one negative domain, negative aspects of support. These are predicted to be associated with better and worse outcomes respectively. Patients' subjective ratings of their own disfigurement are expected to be associated with distress and appearance concern; surgeon ratings are not. Childhood trauma is predicted to be associated with poorer outcomes.

Finally, the 14 subdomains of coping mechanisms are presented. Past findings on coping mechanisms have varied considerably and no direction of association is predicted.

5.2 Acute stress symptoms

5.2.1 Hypotheses and other physical variables

Table 34 presents the prevalence of clinically significant acute stress by different physical variables, and tests for simple associations.

Table 34: Clinically significant acute stress (ASDS ≥56) - prevalence and univariate logistic regressions for physical variables. *p<.05 **p<.01 ***p<.001

Variable (n)	Values (n)	% ASD	OR	[95% CI]
Mechanism of injury (222)	Accidental (145)	27.59	1	
	Violent (77)	44.16	2.08*	[1.16,3.70]
Injury site (222)	No facial injury (98)	36.73	1	
	Facial injury (124)	30.65	0.76	[0.43,1.33]
Polytrauma (173)	No (117)	29.91	1	
	Yes (56)	42.86	1.76	[0.91,3.40]
Head injury (222)	No known HI (153)	34.64	1	
	Head injury (69)	30.43	0.83	[0.45,1.52]

Violent injury was associated with baseline acute stress, significantly increasing the odds. There was no association with facial injury, and although not significant, people with no facial injury had a higher prevalence of acute stress symptoms. Polytrauma, indicating more severe injury, appeared to increase the odds of acute stress, but there was no significant association.

5.2.2 Demographic variables

Demographic variations in acute stress symptoms are shown in Table 35.

Table 35: Clinically significant acute stress (ASDS ≥56) - prevalence and univariate logistic regressions for demographic variables. *p<.05 **p<.01 ***p<.001

Variable (n)	Values (n)	% ASD	OR	[95% CI]
Gender (221)	Male (167)	28.14	1	
	Female (54)	27.78	0.98	[0.50,1.95]
Age (221)	18-25 (58)	25.86	1	
	26-35 (59)	32.20	1.36	[0.61,3.04]
	36-45 (43)	30.23	1.24	[0.52,2.99]
	46-65 (43)	27.91	1.11	[0.46,2.70]
	66+ (18)	16.67	0.57	[0.15,2.26]
Ethnicity (221)	White, White British (165)	23.64	1	
	Black, Black British (23)	52.17	3.52**	[1.44,8.61]
	Asian, Asian British (17)	35.29	1.76	[0.61,5.07]
	Mixed, Multiple, Other (16)	31.25	1.47	[0.48,4.48]
Religion (216)	No religion (80)	20.00	1	
	Christian (104)	27.88	1.55	[0.77,3.10]
	Other (32)	53.13	4.53***	[1.87,10.98]
Birthplace (220)	UK (139)	27.34	1	
	Outside UK (81)	29.63	1.12	[0.61,2.05]
Parents' birthplace (217)	UK (106)	23.58	1	
	Outside UK (111)	31.53	1.49	[0.82,2.72]
Marital status (219)	Single (109)	29.36	1	
	Married or co-habiting (87)	21.84	0.67	[0.35,1.29]
	No longer married (23)	47.83	2.21	[0.88,5.51]
Highest level of education (197)	GCSEs or none (73)	35.62	1	
	A level and above (124)	19.35	0.43*	[0.23,0.83]
Employment status (206)	Employed (137)	24.82	1	
	Student, homemaker (18)	16.67	0.61	[0.17,2.22]
	Unemployed (26)	53.85	3.53**	[1.49,8.38]
	Retired, sick (25)	20.00	0.76	[0.26,2.17]
Income (135)	Below minimum wage (42)	47.62	1	
	Below UK average (57)	17.54	0.23**	[0.09,0.58]
	Above UK average (36)	16.67	0.22**	[0.08,0.64]

Several demographic factors significantly increased the odds of acute stress symptoms. Participants whose religion was 'other' had the strongest association; people who identified as Christian also had increased odds, although this was not significant. Being unemployed and being Black or Black British significantly increased the odds. Two factors had a significant protective effect: being educated to A level or higher, and having an income above the minimum wage. Education and income were significantly associated, with higher incomes more common among those educated to A level ($\chi^2(1, N = 128) = 8.38$, $p = .015$).

5.2.3 Psychosocial variables

Table 36 shows prevalence and associations between acute stress symptoms and other key psychological variables, including the other three outcomes.

Table 36: Clinically significant acute stress (ASDS ≥56) - prevalence and univariate logistic regressions for key psychological variables. *p<.05 **p<.01 ***p<.001

Symptoms of (n)	Values (n)	% ASD	OR
Depression (219)	Low (147)	14.29	1
	High (72)	54.17	7.09***
Anxiety (221)	Low (127)	11.81	1
	High (94)	50.00	7.47***
Appearance concern (195)	Lowest tertile (71)	11.27	1
	Mid tertile (62)	22.58	2.30
	Upper tertile (62)	38.71	4.97***
Past mental health (218)	No history (133)	21.05	1
	History (85)	37.65	2.26**
Alcohol misuse (116)	Normal (86)	25.58	1
	Hazardous (30)	23.33	0.89

Symptoms of acute stress were highly comorbid with those of depression and anxiety, with markedly increased odds among people experiencing symptoms of depression or anxiety. Among people with significant depressive symptoms, over half also had acute stress symptoms, while among those with anxiety symptoms, half had acute stress symptoms. Appearance concern also increased the odds of acute stress symptoms. Although the association was not as strong, a history of any mental health problems significantly increased the odds of acute stress. There was no significant effect of alcohol misuse.

Explanatory variables are shown in Table 37.

Table 37: Clinically significant acute stress (ASDS ≥56) - univariate logistic regressions for explanatory variables. *p<.05 **p<.01 ***p<.001

Variable (n)	OR	[95% CI]
WEMWBS: Wellbeing (170)	0.93***	[0.89,0.96]
WHOQOL: Physical (203)	0.97**	[0.95,0.99]
WHOQOL: Psychological (203)	0.95***	[0.93,0.97]
WHOQOL: Social (203)	0.97***	[0.95,0.99]
WHOQOL: Environmental (202)	0.95***	[0.93,0.97]
WHOQOL: Spiritual (198)	1.00	[0.99,1.01]
CPQ: Confiding support (170)	1.03	[0.94,1.14]
CPQ: Practical support (171)	1.00	[0.87,1.14]
CPQ: Negative aspects (170)	1.09	[0.96,1.24]
CTQ: Physical Abuse (114)	1.10	[0.98,1.24]
CTQ: Emotional Abuse (114)	1.05	[0.93,1.19]
CTQ: Emotional Neglect (114)	1.08	[0.99,1.18]
CTQ: Physical Neglect (114)	1.18*	[1.03,1.35]
CTQ: Sexual Abuse (114)	1.13	[0.96,1.33]
CTQ: Total childhood trauma (114)	1.04*	[1.00,1.07]
Disfigurement: participant (194)	1.14*	[1.02,1.28]
Disfigurement: surgeon (46)	1.39*	[1.00,1.91]
Disfigurement: researcher (154)	1.11	[0.96,1.29]

Higher scores on measures of wellbeing and quality of life were associated with a significantly reduced likelihood of acute stress symptoms, with the exception of spiritual quality of life. Childhood physical neglect and higher total scores for childhood trauma both increased the odds of acute stress. Both participant and surgeon disfigurement scores were associated with acute stress; higher scores, which indicated greater disfigurement, were associated with higher ASDS scores. There was no significant effect of social support.

Table 38 presents the 14 mechanisms of coping and their association with acute stress.

Table 38: Clinically significant acute stress (ASDS ≥56) - univariate logistic regressions for coping mechanisms. *p<.05 **p<.01 ***p<.001

Variable (n)	OR	[95% CI]
Acceptance (173)	0.91	[0.75,1.12]
Active coping (172)	1.12	[0.93,1.36]
Behavioural disengagement (169)	1.44**	[1.15,1.80]
Denial (170)	1.46***	[1.21,1.77]
Humour (173)	0.75**	[0.62,0.90]
Planning (173)	1.33**	[1.10,1.61]
Positive reframing (171)	1.20	[1.00,1.45]
Self-distraction (170)	1.08	[0.88,1.32]
Substance use (171)	1.24*	[1.02,1.50]
Self-blame (172)	1.35**	[1.11,1.64]
Using emotional support (172)	0.96	[0.81,1.15]
Using instrumental support (171)	1.02	[0.85,1.22]
Venting (172)	1.46***	[1.19,1.79]
Religion (171)	1.22*	[1.04,1.43]

A number of coping mechanisms were significantly associated with increased symptoms of acute stress. The strongest associations were for denial and venting, followed by behavioural disengagement, planning, substance use, self-blame, and religion. Humour was significantly associated with lower levels of acute stress.

5.3 Depressive symptoms

5.3.1 Hypotheses and other physical variables

Associations between depressive symptoms and physical variables are shown in Table 39.

Table 39: Clinically significant depressive symptoms (HADS-D ≥8) - prevalence and univariate logistic regressions for physical variables. *p<.05 **p<.01 ***p<.001

Variable (n)	Values (n)	% Dep	OR	[95% CI]
Mechanism of injury (221)	Accidental (145)	20.69	1	
	Violent (76)	42.11	2.79***	[1.52,5.12]
Injury site (221)	No facial injury (97)	27.84	1	
	Facial injury (124)	28.23	1.02	[0.56,1.84]
Polytrauma (172)	No (116)	20.69	1	
	Yes (56)	35.71	2.13*	[1.05,4.32]
Head injury (221)	No known HI (154)	32.47	1	
	Head injury (67)	17.91	0.45*	[0.22,0.92]

Being injured through violence was associated with significantly increased odds of depressive symptoms. Polytrauma was also associated with increased odds, while having a head injury was associated with significantly reduced odds. There was no association with injury site.

5.3.2 Demographic variables

Table 40 shows demographic associations with depressive symptoms.

Table 40: Clinically significant depressive symptoms (HADS-D ≥8) - prevalence and univariate logistic regressions for demographic variables. *p<.05 **p<.01 ***p<.001

Variable (n)	Values (n)	% Dep	OR	[95% CI]
Gender (222)	Male (169)	31.36	1	
	Female (53)	39.62	1.44	[0.76,2.72]
Age (222)	18-25 (58)	34.48	1	
	26-35 (59)	32.20	0.90	[0.42,1.95]
	36-45 (43)	41.86	1.37	[0.61,3.08]
	46-65 (44)	31.82	0.89	[0.39,2.04]
	66+ (18)	16.67	0.38	[0.10,1.47]
Ethnicity (222)	White, White British (164)	26.22	1	
	Black, Black British (25)	60.00	4.22**	[1.76,10.10]
	Asian, Asian British (17)	58.82	4.02**	[1.44,11.22]
	Mixed, Multiple, Other (16)	37.50	1.69	[0.58,4.92]
Religion (215)	No religion (80)	30.00	1	
	Christian (103)	26.21	0.83	[0.43,1.59]
	Other (32)	65.63	4.45***	[1.86,10.66]
Birthplace (221)	UK (141)	31.91	1	
	Outside UK (80)	36.25	1.21	[0.68,2.16]
Parents' birthplace (218)	UK (107)	28.97	1	
	Outside UK (111)	36.94	1.44	[0.81,2.53]
Marital status (220)	Single (110)	35.45	1	
	Married or co-habiting (87)	25.29	0.62	[0.33,1.15]
	No longer married (23)	52.17	1.99	[0.80,4.92]
Highest level of education (197)	GCSEs or none (74)	37.84	1	
	A level and above (123)	28.46	0.65	[0.35,1.20]
Employment status (206)	Employed (136)	28.68	1	
	Student, homemaker (19)	31.58	1.15	[0.41,3.24]
	Unemployed (26)	53.85	2.90*	[1.23,6.83]
	Retired, sick (25)	24.00	0.79	[0.29,2.11]
Income (134)	Below minimum wage (41)	36.59	1	
	Below UK average (57)	24.56	0.56	[0.23,1.36]
	Above UK average (36)	19.44	0.42	[0.15,1.19]

Those in the 'other' religion category had significantly increased odds of depressive symptoms, relative to those with no religion; as did those who were Black or Black British, or Asian or British Asian, compared with being white, and those who were unemployed compared with being employed.

5.3.3 Psychosocial variables

Table 41 presents associations between depressive symptoms and other psychological outcomes.

Table 41: Clinically significant depressive symptoms (HADS-D ≥8) - prevalence and univariate logistic regressions for key psychological variables. *p<.05 **p<.01 ***p<.001

Symptoms of (n)	Values (n)	% Dep	OR	[95% CI]
Acute stress (219)	Low (159)	20.75	1	
	High (60)	65.00	7.09***	[3.69,13.64]
Anxiety (222)	Low (128)	15.63	1	
	High (94)	57.45	7.29***	[3.89,13.67]
Appearance concern (194)	Lowest tertile (71)	15.49	1	
	Mid tertile (62)	20.97	1.45	[0.60,3.51]
	Upper tertile (61)	59.02	7.85***	[3.46,17.85]
Past mental health (219)	No history (135)	26.67	1	
	History (84)	42.86	2.06*	[1.16,3.67]
Alcohol misuse (117)	Normal (87)	35.63	1	
	Hazardous (30)	30.00	0.77	[0.32,1.90]

Significant depressive symptoms had a high degree of comorbidity with symptoms of acute stress and anxiety, and had significant associations with each. Of the participants with significant symptoms of acute stress, almost two thirds had depressive symptoms. Of those with anxiety symptoms, well over half also had depressive symptoms. There was also a significant association with the highest levels of appearance concern. Past mental health problems were associated with increased odds.

The associations between depressive symptoms and explanatory variables are presented in Table 42.

Table 42: Clinically significant depressive symptoms (HADS-D ≥8) - univariate logistic regressions for explanatory variables. *p<.05 **p<.01 ***p<.001

Variable (n)	OR	[95% CI]
WEMWBS: Wellbeing (171)	0.90***	[0.86,0.93]
WHOQOL: Physical (203)	0.96***	[0.94,0.98]
WHOQOL: Psychological (203)	0.93***	[0.90,0.95]
WHOQOL: Social (203)	0.97***	[0.95,0.98]
WHOQOL: Environmental (202)	0.95***	[0.93,0.96]
WHOQOL: Spiritual (198)	0.95***	[0.93,0.96]
CPQ: Confiding support (171)	0.94	[0.86,1.02]
CPQ: Practical support (172)	0.90	[0.80,1.01]
CPQ: Negative aspects (171)	1.03	[0.91,1.16]
CTQ: Physical Abuse (114)	0.95	[0.81,1.11]
CTQ: Emotional Abuse (114)	0.99	[0.86,1.13]
CTQ: Emotional Neglect (114)	1.11*	[1.02,1.21]
CTQ: Physical Neglect (114)	1.20*	[1.04,1.38]
CTQ: Sexual Abuse (114)	1.09	[0.93,1.28]
CTQ: Total childhood trauma (114)	1.03	[0.99,1.06]
Disfigurement: participant (194)	1.22***	[1.10,1.36]
Disfigurement: surgeon (46)	1.21	[0.89,1.63]
Disfigurement: researcher (153)	1.01	[0.87,1.17]

Higher scores on all quality of life measures and wellbeing were associated with reduced odds of depressive symptoms. People who had experienced emotional or physical neglect in childhood had significantly increased odds of depressive symptoms. Participants' own ratings of their disfigurement were associated with high depressive symptoms.

Table 43 presents associations between depressive symptoms and the different domains of coping.

Table 43: Clinically significant depressive symptoms (HADS-D ≥8) - univariate logistic regressions for coping mechanisms. *p<.05 **p<.01 ***p<.001

Variable (n)	OR	[95% CI]
Acceptance (174)	0.83*	[0.68,1.00]
Active coping (173)	1.06	[0.89,1.25]
Behavioural disengagement (170)	1.41**	[1.14,1.76]
Denial (171)	1.50***	[1.24,1.81]
Humour (174)	0.79**	[0.67,0.93]
Planning (174)	1.23*	[1.04,1.44]
Positive reframing (172)	1.03	[0.87,1.22]
Self-distraction (171)	0.83	[0.68,1.00]
Substance use (172)	1.17	[0.98,1.41]
Self-blame (172)	1.21*	[1.01,1.44]
Using emotional support (173)	0.90	[0.76,1.06]
Using instrumental support (172)	1.03	[0.87,1.21]
Venting (173)	1.28*	[1.06,1.55]
Religion (172)	1.01	[0.86,1.18]

High levels of depressive symptoms were significantly associated behavioural disengagement, denial, planning, self-blame and venting. Acceptance coping and humour had a significantly protective effect.

5.4 Anxiety symptoms

5.4.1 Hypotheses and other physical variables

Associations between anxiety symptoms and physical variables are presented in Table 44.

Table 44: Clinically significant anxiety symptoms (HADS-A ≥8) - prevalence and univariate logistic regressions for physical variables. *p<.05 **p<.01 ***p<.001

Variable (n)	Values (n)	% Anx	OR	[95% CI]
Mechanism of injury (224)	Accidental (147)	39.46	1	
	Violent (77)	48.05	1.42	[0.81,2.48]
Injury site (224)	No facial injury (100)	37.00	1	
	Facial injury (124)	46.77	1.50	[0.87,2.56]
Polytrauma (175)	No (117)	41.03	1	
	Yes (58)	39.66	0.94	[0.50,1.80]
Head injury (224)	No known HI (155)	42.58	1	
	Head injury (69)	42.03	0.98	[0.55,1.74]

There were no significant associations between anxiety symptoms and the physical variables. There was a higher prevalence of anxiety symptoms in both the hypothesised risk factors, violent injury and facial injury; however, this was not statistically significant.

5.4.2 Demographic variables

Demographic differences in anxiety symptoms are presented in Table 45.

Table 45: Clinically significant anxiety symptoms (HADS-A ≥8) - prevalence and univariate logistic regressions for demographic variables. *p<.05 **p<.01 ***p<.001

Variable (n)	Values (n)	% Anx	OR	[95% CI]
Gender (224)	Male (170)	41.18	1	
	Female (54)	46.30	1.23	[0.67,2.28]
Age (224)	18-25 (59)	42.37	1	
	26-35 (59)	44.07	1.07	[0.52,2.22]
	36-45 (43)	55.81	1.72	[0.78,3.80]
	46-65 (45)	33.33	0.68	[0.30,1.52]
	66+ (18)	27.78	0.52	[0.17,1.66]
Ethnicity (224)	White, White British (166)	38.55	1	
	Black, Black British (25)	48.00	1.47	[0.63,3.42]
	Asian, Asian British (17)	64.71	2.92*	[1.03,8.29]
	Mixed, Multiple, Other (16)	50.00	1.59	[0.57,4.46]
Religion (217)	No religion (80)	40.00	1	
	Christian (105)	38.10	0.92	[0.51,1.68]
	Other (32)	65.63	2.86*	[1.22,6.74]
Birthplace (223)	UK (142)	42.96	1	
	Outside UK (81)	41.98	0.96	[0.55,1.67]
Parents' birthplace (220)	UK (108)	40.74	1	
	Outside UK (112)	43.75	1.13	[0.66,1.93]
Marital status (222)	Single (111)	44.14	1	
	Married or co-habiting (88)	37.50	0.76	[0.43,1.34]
	No longer married (23)	56.52	1.64	[0.67,4.07]
Highest level of education (198)	GCSEs or none (74)	40.54	1	
	A level and above (124)	38.71	0.93	[0.51,1.67]
Employment status (208)	Employed (138)	36.96	1	
	Student, homemaker (19)	36.84	1	[0.37,2.69]
	Unemployed (26)	69.23	3.84**	[1.56,9.46]
	Retired, sick (25)	32.00	0.80	[0.32,1.99]
Income (136)	Below minimum wage (42)	45.24	1	
	Below UK average (58)	37.93	0.74	[0.33,1.66]
	Above UK average (36)	33.33	0.61	[0.24,1.52]

Unemployment had the strongest association with clinically significant anxiety symptoms. People identifying as Asian or British Asian, or identifying with a minority religion also had significantly increased odds of anxiety symptoms.

5.4.3 Psychosocial variables

Table 46 shows associations between anxiety symptoms and other core psychological variables.

Table 46: Clinically significant anxiety symptoms (HADS-A ≥8) - prevalence and univariate logistic regressions for key psychological variables. *p<.05 **p<.01 ***p<.001

Symptoms of (n)	Values (n)	% Anx	OR	[95% CI]
Acute stress (221)	Low (159)	29.56	1	
	High (62)	75.81	7.47***	[3.81,14.65]
Depression (222)	Low (148)	27.03	1	
	High (74)	72.97	7.29***	[3.89,13.67]
Appearance concern (196)	Lowest tertile (71)	15.49	1	
	Mid tertile (63)	30.16	2.36*	[1.02,5.45]
	Upper tertile (62)	74.19	15.68***	[6.65,37.00]
Past mental health (221)	No history (136)	34.56	1	
	History (85)	54.12	2.23**	[1.28,3.89]
Alcohol misuse (119)	Normal (89)	32.58	1	
	Hazardous (30)	40.00	1.38	[0.59,3.24]

Among people with significant acute stress or depressive symptoms, around three quarters also experienced anxiety. In both acute stress and depression, significant symptoms significantly increased the odds of anxiety symptoms. High levels of appearance concern were also strongly associated with anxiety symptoms, as was past mental health.

Explanatory variables are shown in Table 47, in terms of their associations with anxiety symptoms.

Table 47: Clinically significant anxiety symptoms (HADS-A ≥8) - univariate logistic regressions for explanatory variables. *p<.05 **p<.01 ***p<.001

Variable (n)	OR	[95% CI]
WEMWBS: Wellbeing (173)	0.91***	[0.88,0.94]
WHOQOL: Physical (205)	0.97***	[0.95,0.99]
WHOQOL: Psychological (205)	0.93***	[0.91,0.95]
WHOQOL: Social (205)	0.95***	[0.94,0.97]
WHOQOL: Environmental (204)	0.94***	[0.93,0.96]
WHOQOL: Spiritual (200)	1.00	[0.98,1.01]
CPQ: Confiding support (173)	0.99	[0.91,1.07]
CPQ: Practical support (174)	1.03	[0.91,1.15]
CPQ: Negative aspects (173)	1.22**	[1.08,1.38]
CTQ: Physical Abuse (116)	1.09	[0.97,1.22]
CTQ: Emotional Abuse (116)	1.13*	[1.00,1.27]
CTQ: Emotional Neglect (116)	1.08	[1.00,1.17]
CTQ: Physical Neglect (116)	1.28**	[1.10,1.49]
CTQ: Sexual Abuse (116)	1.06	[0.91,1.24]
CTQ: Total childhood trauma (116)	1.04**	[1.01,1.08]
Disfigurement: participant (196)	1.17**	[1.06,1.30]
Disfigurement: surgeon (46)	1.02	[0.77,1.35]
Disfigurement: researcher (155)	1.06	[0.92,1.22]

There were significant associations between good wellbeing and quality of life and lower levels of anxiety symptoms, with the exception of spiritual quality of life. Negative aspects of social support significantly increased the odds of anxiety symptoms, as did childhood physical neglect and high total scores for childhood trauma. Participants' own ratings of their level of disfigurement were associated with anxiety.

Associations between anxiety symptoms and coping mechanisms are shown in Table 48.

Table 48: Clinically significant anxiety symptoms (HADS-A ≥8) - univariate logistic regressions for coping mechanisms. *p<.05 **p<.01 ***p<.001

Variable (n)	OR	[95% CI]
Acceptance (176)	0.90	[0.75,1.08]
Active coping (175)	1.12	[0.95,1.32]
Behavioural disengagement (172)	1.65***	[1.28,2.11]
Denial (173)	1.45***	[1.21,1.75]
Humour (176)	0.82**	[0.71,0.95]
Planning (176)	1.28**	[1.09,1.50]
Positive reframing (174)	1.10	[0.94,1.29]
Self-distraction (173)	1.01	[0.85,1.21]
Substance use (174)	1.23*	[1.02,1.48]
Self-blame (174)	1.51***	[1.25,1.82]
Using emotional support (175)	1.03	[0.88,1.20]
Using instrumental support (174)	1.17	[1.00,1.37]
Venting (175)	1.35**	[1.12,1.63]
Religion (174)	1.06	[0.91,1.23]

The coping mechanisms that were significantly associated with higher levels of acute stress were behavioural disengagement, denial, planning, substance use, self-blame and venting. Humour had a significantly protective effect.

5.5 Appearance concerns

Appearance concern is analysed in linear regressions using robust standard errors.

5.5.1 Hypotheses and other physical variables

Table 49 shows associations between appearance concern and physical variables.

Table 49: Appearance concern (DAS24) - univariate regressions for physical variables. *p<.05 **p<.01 ***p<.001

Variable (n)	Values (n)	Coefficient	[95% CI]
Mechanism of injury (196)	Accidental (130)	0.0	
	Violent (66)	4.50*	[0.32,8.67]
Injury site (196)	No facial injury (87)	0.0	
	Facial injury (109)	0.23	[-3.48,3.94]
Polytrauma (155)	No (103)	0.0	
	Yes (52)	-2.87	[-6.61,0.88]
Head injury (196)	No known HI (132)	0.0	
	Head injury (64)	-6.70***	[-10.09,-3.30]

Mechanism of injury was significant, with those injured violently experiencing significantly higher levels of appearance concern. People who had experienced a head injury had significantly lower levels of appearance concern. There were no differences by site of injury.

5.5.2 Demographic variables

Table 50 shows associations between appearance concern and demographic variables.

Table 50: Appearance concern (DAS24) - univariate regressions for demographic variables. *p<.05 **p<.01 ***p<.001

Variable (n)	Values (n)	Coefficient	[95% CI]
Gender (196)	Male (149)	0.0	
	Female (47)	4.50*	[0.13,8.87]
Age (196)	18-25 (51)	0.0	
	26-35 (54)	-1.19	[-6.36,3.98]
	36-45 (40)	2.040	[-3.76,7.83]
	46-65 (38)	-6.07*	[-11.13,-1.00]
	66+ (13)	-9.50**	[-15.66,-3.34]
Ethnicity (196)	White, White British (149)	0.0	
	Black, Black British (19)	2.76	[-4.36,9.87]
	Asian, Asian British (15)	10.43***	[4.36,16.49]
	Mixed, Multiple, Other (13)	0.22	[-5.98,6.42]
Religion (190)	No religion (77)	0.0	
	Christian (88)	-2.44	[-6.46,1.58]
	Other (25)	6.93*	[1.06,12.79]
Birthplace (196)	UK (122)	0.0	
	Outside UK (74)	3.72	[-0.08,7.52]
Parents' birthplace (193)	UK (93)	0.0	
	Outside UK (100)	3.72	[-0.08,7.52]
Marital status (195)	Single (97)	0.0	
	Married or co-habiting (79)	-2.88	[-6.80,1.04]
	No longer married (19)	-1.21	[-7.58,5.17]
Highest level of education (183)	GCSEs or none (64)	0.0	
	A level and above (119)	2.24	[-1.94,6.42]
Employment status (191)	Employed (129)	0.0	
	Student, homemaker (17)	5.29	[-0.90,11.47]
	Unemployed (20)	11.79***	[5.27,18.31]
	Retired, sick (25)	-1.35	[-7.33,4.62]
Income (127)	Below minimum wage (37)	0.0	
	Below UK average (54)	-5.47	[-11.06,0.12]
	Above UK average (36)	-5.88*	[-11.68,-0.08]

Appearance concern was markedly higher among people who identified as Asian or British Asian, those identifying with minority religious groups, and unemployed people. Women had significantly higher scores than men, while people aged 46 and over had significantly lower scores than the youngest age group. People whose income was in the highest bracket had significantly lower levels of appearance concern than those in the lowest bracket.

5.5.3 Psychosocial variables

Associations between appearance concern and other key psychological variables are shown in Table 51.

Table 51: Appearance concern (DAS24) - univariate regressions for key psychological variables. *p<.05 **p<.01 ***p<.001

Symptoms of (n)	Values (n)	Coefficient	[95% CI]
Acute stress (195)	Low (149)	0.0	
	High (46)	9.26***	[4.61,13.92]
Depression (194)	Low (134)	0.0	
	High (60)	11.06***	[7.09,15.03]
Anxiety (196)	Low (120)	0.0	
	High (76)	14.18***	[10.68,17.67]
Past mental health (195)	No history (120)	0.0	
	History (75)	8.37***	[4.54,12.20]
Alcohol misuse (113)	Normal (84)	0.0	
	Hazardous (29)	0.53	[-5.01,6.07]

Appearance concern was highly associated with the three psychological outcomes, and there were significantly higher scores among people with high symptoms of acute stress, depression or anxiety. Those with a history of mental health concerns also had higher levels of appearance concern.

Table 52 shows associations between appearance concern and explanatory variables.

Table 52: Appearance concern (DAS24) - univariate regressions for explanatory variables. *p<.05 **p<.01 ***p<.001

Variable (n)	Coefficient	[95% CI]
WEMWBS: Wellbeing (166)	-0.54***	[-0.68,-0.40]
WHOQOL: Physical (190)	-0.25***	[-0.36,-0.13]
WHOQOL: Psychological (191)	-0.43***	[-0.58,-0.29]
WHOQOL: Social (191)	-0.24***	[-0.33,-0.15]
WHOQOL: Environmental (190)	-0.34***	[-0.43,-0.24]
WHOQOL: Spiritual (187)	-0.07	[-0.15,0.01]
CPQ: Confiding support (166)	0.27	[-0.25,0.78]
CPQ: Practical support (167)	0.17	[-0.57,0.90]
CPQ: Negative aspects (166)	0.78*	[0.07,1.50]
CTQ: Physical Abuse (110)	0.75	[-0.18,1.69]
CTQ: Emotional Abuse (110)	0.99*	[0.12,1.86]
CTQ: Emotional Neglect (110)	0.99**	[0.38,1.59]
CTQ: Physical Neglect (110)	1.83***	[1.22,2.45]
CTQ: Sexual Abuse (110)	0.93	[-0.12,1.97]
CTQ: Total childhood trauma (110)	0.41***	[0.20,0.63]
Disfigurement: participant (191)	1.19***	[0.51,1.88]
Disfigurement: surgeon (43)	0.61	[-1.35,2.57]
Disfigurement: researcher (138)	-0.03	[-1.06,1.00]

Levels of appearance concern were significantly lower among people reporting higher levels of wellbeing, and high quality of life in the physical, psychological, social and environmental domains. People with higher scores on negative aspects of social support had significantly increased appearance concern. Childhood trauma was associated with more appearance concern on several domains: emotional abuse, emotional neglect and physical neglect, as well as overall scores. Participants' disfigurement scores were also associated with greater appearance concern.

Table 53 shows associations between appearance concern and coping mechanisms.

Table 53: Appearance concern (DAS24) - univariate regressions for coping mechanisms. *p<.05 **p<.01 ***p<.001

Variable (n)	Coefficient	[95% CI]
Acceptance (169)	-0.43	[-1.73,0.87]
Active coping (168)	1.08	[-0.01,2.18]
Behavioural disengagement (165)	3.40***	[2.28,4.52]
Denial (166)	2.11***	[1.12,3.10]
Humour (169)	-0.86	[-1.79,0.06]
Planning (167)	1.61***	[0.70,2.53]
Positive reframing (166)	0.79	[-0.20,1.78]
Self-distraction (167)	1.41*	[0.24,2.58]
Substance use (168)	2.00***	[1.03,2.97]
Self-blame (168)	3.15***	[2.04,4.26]
Using emotional support (167)	0.41	[-0.62,1.44]
Using instrumental support (167)	1.17*	[0.14,2.20]
Venting (168)	3.41***	[2.39,4.43]
Religion (167)	0.67	[-0.24,1.59]

There were significant associations between higher levels of appearance concern and behavioural disengagement, denial, planning, self-distraction, substance use, self-blame, using instrumental support and venting.

5.6 Results II discussion

5.6.1 Role of physical variables in baseline outcomes

Hypothesis I

The hypothesis that violence was associated with worse psychological outcomes was supported in relation to PTSS, depressive symptoms and appearance concern. These findings are tested further in the adjusted models.

There was no significant evidence that the hypothesis was correct in relation to anxiety symptoms. However, anxiety was common in the sample so the measure may have lacked sensitivity to discern differences.

Hypothesis II

Contrary to the hypothesis, there was no support for the theory that people with facial injuries experience worse psychological outcomes. There were no differences between those with and without facial injuries on any measure of psychological distress. This is discussed further in section 7.2.

The fact that facial injuries were not associated with greater appearance concern has some precedent. Previous research has reported that disfigurements affecting the head or face were associated with less concern, while disfigurements of the trunk, genitals and legs were associated with more concern (Carr et al., 2005). However, there were important differences between the sample used in that study and the present one. Participants were people awaiting plastic surgery for an objectively identified 'abnormality of appearance', so they were already worried about their appearance. In addition, the sample was heterogeneous, and included disfigurements caused by congenital malformation, disease, injury and burns, and life course changes such as ageing and the effects of pregnancy.

Other physical variables

There were no notable associations between physical aspects of injury and psychological outcomes except for an intriguing finding that those who had experienced a head injury reported significantly lower levels of appearance concern. Speculatively, this could be the result of mild traumatic brain injury among at least some of those with head injury, leading to behavioural and attitudinal changes. This is discussed in more detail in section 6.5.

5.6.2 Role of demographic factors in baseline outcomes

Ethnic minority groups had particularly high odds of experiencing clinically significant symptoms of psychological distress. However, the patterns of these higher odds were complicated. Those who were Black or Black British had significantly increased odds of both acute stress and depressive symptoms, but not of anxiety. Meanwhile those who were Asian or British Asian had increased odds of depressive and anxiety symptoms, but not of acute stress. This could reflect real cultural differences in the experience of distress, or it could be due to individual variation within the relatively small sample. These two ethnic groups were at increased odds of experiencing violent injury in the first place, which could have contributed to the observed differences.

Nationally, Black men have been reported to have an increased risk of current PTSS (McManus et al., 2009), which accords with the present findings. Similarly, an American study reported an association between PTSS and African American heritage (Stephens et al., 2010). However, the SELCoH study found no ethnic differences in PTSS in its South East London community sample. It did reveal other subtle differences between Black African and Black Caribbean residents though, with the latter at increased risk of common mental disorders, which broadly equate to depressive and anxiety symptoms (Hatch et al., 2011). Ethnic groups could not be analysed at this level of detail in the present study. However, in conjunction with the apparent ethnic differences in the present sample, this highlights the importance of retaining specificity in the analysis of ethnic groupings.

People whose religion was categorised as ‘other’, had increased odds of experiencing symptoms of acute stress, depressive and anxiety symptoms, relative to the reference group of ‘no religion’. These associations were among the strongest, with large odds ratios and high statistical significance. This was therefore a relatively strong finding, but one which required judicious interpretation. It did not appear to reflect an effect of any religion per se, as opposed to no religion. The odds of distress among Christians varied in different outcomes, and were not significantly different from those with ‘no religion’ on any. In the ‘other’ group, the majority (69%) had specified their religion as Muslim. The remainder identified as Hindu (9%), Sikh (6%) and Jewish (3%); 13% identified with other unspecified faiths. Few people (4%) in the ‘other’ religion category had identified their ethnicity as white. The ‘other’ religion category therefore appeared to represent an aspect of ethnic minority status.

The significant associations for this variable supported the idea that susceptibility to distress fell along complex ethno-cultural lines, as suggested by the ethnic differences. There was some further evidence of this; appearance concern was significantly higher among Asians and British Asians, and among those whose religion was ‘other’. However, participants’ place of birth was not associated

with any psychological outcomes, and nor was parents' place of birth, indicating there was not a simple effect of being an immigrant or the child of immigrants.

The different outcomes between Asian and Black groups were intriguing. Whilst it would increase statistical power to combine ethnicity into a binary category of white and not white, these univariate findings suggest it would obscure important differences. Previous trauma studies of outcomes in different ethnic groups are of limited use in this context, as the groups being studied are rarely comparable. There is therefore a particular value in preserving these groupings, to help understand the particular issues in this sample of trauma patients.

People who were unemployed had significantly increased odds of all three psychological outcomes, and had significantly higher appearance concern. Again, unemployed people were also at higher odds of being violently injured, which may explain some of the increased odds. Higher income and education had a protective effect against acute stress symptoms, but had no significant association with depressive and anxiety outcomes. Higher incomes were associated with lower levels of appearance concern. Unemployment, lower income and lower educational qualifications have all been linked to low socio-economic status (McLennan, Barnes, Noble, Davies, & Garratt, 2011; Payne & Abel, 2012) and suggest a cumulative risk factor for deprivation. These three factors were also associated with PTSS in the SELCoH study (Frissa et al., 2013). The researchers noted that low socio-economic status can also be a consequence of poor mental health, so the direction of this relationship is debatable.

It was thought-provoking that there were no associations between gender and psychological distress, as women are known to be more susceptible to depression and anxiety (Burton, 2011; McManus et al., 2009) as well as PTSS (Glynn et al., 2003; Hull et al., 2003). Women had a higher prevalence of depressive and anxiety symptoms, but this was not statistically significant, and prevalence of acute stress symptoms was similar in men and women. These results were congruent with the pilot study findings, which also had no apparent gender differences. Women did, however, have significantly higher appearance concern, in keeping with some of the appearance literature (Rumsey et al., 2004; Thombs et al., 2008).

Age was not associated with the three psychological outcomes, although there was a non-significant tendency suggesting increased age had a protective effect. In appearance concern, people aged over 45 had significantly lower levels of concern. Marital status did not emerge as significant, although there was a tendency towards better outcomes among those who were married or living with a partner, and worse outcomes for those who were no longer married, i.e. who were divorced,

separated or widowed. Being divorced, separated or widowed has been associated with PTSS in previous UK samples (Frissa et al., 2013), and the small subsample in the present study may have hampered associations.

5.6.3 Role of core psychological variables

There were strong associations between symptoms of ASD, depression and anxiety: the presence of one increased the odds of experiencing each of the others by a factor of seven or more, indicating high levels of symptom comorbidity. These were the strongest univariate associations observed. Among trauma patients, PTSS and depressive symptoms have frequently been observed to co-occur (Breslau et al., 2000; Bryant et al., 2010; Shalev et al., 1998), and depressive and anxiety symptoms often go hand in hand in the general population (Plomin et al., 2008).

The simple measure of past mental health also proved highly significant: those reporting any past history had significantly increased odds of current acute stress, depressive and anxiety symptoms. It is therefore clinically important to have information on patients' history of mental illness.

Appearance concern was strongly associated with all three measures of psychological distress, and with past mental health. A question arises as to whether appearance concern is a product of psychological distress: do people feel more concerned about their appearance because they are psychologically distressed? This seems more plausible than that appearance concern would cause distress. This question is addressed in Chapter 6.

5.6.4 Role of explanatory variables

The data from these psychosocial variables were used to understand the outcome measures in more detail; because of the limited sample size, it was not possible to include them in the later adjusted models.

Alcohol misuse (AUDIT)

There was no significant evidence of a role for alcohol misuse, contrary to expectations. It is possible that other substances were misused, rather than alcohol; this is discussed in more detail below, under coping mechanisms.

Wellbeing and quality of life (WEMWBS and WHOQOL)

Almost all measures of wellbeing and quality of life had a strong inverse relationship with the outcomes: symptoms of acute stress, depression and anxiety and appearance concern were associated with lower levels of wellbeing and quality of life. On the one hand, this may reflect the fact that high levels of quality of life and wellbeing are protective in the face of traumatic injury, and

help minimise psychological distress. On the other, psychological distress, in conjunction with sudden physical injury, can lead to worse physical health, weakened social support, and a more negative outlook on life.

The association between mental health and environmental quality of life echoes findings from the ORiEL study, in which East London adolescents who rated their neighbourhoods as unsafe or unpleasant reported significantly higher symptoms of depression, and significantly lower wellbeing (Smith et al., 2015). As this was a community sample, it raises the possibility that people in the present sample who felt their environment was poor may have had worse mental health pre-injury.

Spiritual quality of life had a weak role compared with other quality of life measures; it was associated with lower levels of depressive symptoms, but was not associated with other outcomes. Spiritual and religious beliefs and practices have typically been associated with better psychological outcomes (Bryant-Davis & Wong, 2013; King et al., 2013), and the lack of associations here was anomalistic. The qualitative vignette analysis noted that there was little discussion about religion in the vignettes, with just one participant among those analysed mentioning prayer (Skinner, 2014). However, the WHOQOL measure is not specifically religious; rather it asks questions such as "To what extent do you feel your life to be meaningful?" and "To what extent do your personal beliefs give you the strength to face difficulties?", and is conceived as a spiritual rather than a religious scale. Research from the National Psychiatric Morbidity Study in England found that people who described themselves as having a spiritual understanding of life without a religious framework had increased odds of disorders including generalised anxiety, phobias and drug dependency (King et al., 2013). It is possible that the spiritual measure in this study has discerned such an effect. This highlights the importance of differentiating between religious and spiritual belief, and provides a possible explanation for the lack of associations with the WHOQOL spiritual domain in the present study.

Close persons questionnaire (CPQ)

There were no associations between psychological outcomes and the two positive domains of the Close Persons questionnaire. Previous studies have reported on the protective effects of good social support, including among trauma patients (Brewin et al., 2000), but this was not supported by the present data. However, negative social support in the present sample significantly increased the odds of anxiety symptoms and of appearance concern. Negative aspects of social support include items asking "did talking to this person make things worse?" and "did this person give you worries, problems and stress?", referring to the person the respondent has felt closest to in the past year.

This suggests that an inability to confide in and rely on someone leads to higher levels of anxiety and appearance concern.

Coping mechanisms

Coping mechanisms presented a complicated picture, with a range of different effects. Interestingly, several of the key themes in the qualitative vignettes analysis closely reflected coping domains, although the themes were constructed independently and without reference to concepts of coping. These qualitative themes provided compelling additional data for contextualising the quantitative findings.

Only two coping styles were associated with better outcomes. Acceptance coping, with items like "I've been learning to live with it", was associated with significantly lower levels of depressive symptoms. Humour, which includes items like "I've been making fun of the situation", proved to have a protective effect against symptoms of acute stress, depression and anxiety. One of the qualitative themes was 'making light of what has happened', in which participants used humour to try to take a positive view of events. Participants made statements such as "Funnily enough, I haven't cried yet" (female, 58), and said that the events would be "a story to tell one day" (male, 47). A young man reported joking around in the ambulance (Skinner, 2014, p. 23). Given the quantitative evidence on the protective effect of humour, these stances would appear to have real benefit. However, the qualitative theme could also be linked to the coping domain of positive reframing, and there were no associations, either positive or negative, between that and the psychological outcomes.

Denial had a highly significant relationship with all outcomes, so endorsing statements like "I've been refusing to believe that it has happened" was associated with symptoms of acute stress, depression and anxiety, as well as appearance concern. Denial could be construed as the reverse of acceptance coping, which had a protective effect. It also seems probable that the cognitions involved are similar to those observed in avoidant PTSS symptoms. A meta-analysis of coping strategies reported an association between distress and avoidant coping styles such as denial (Littleton et al., 2007).

Behavioural disengagement was associated with all outcomes; this strategy includes items like "I've been giving up the attempt to cope". Venting ("I've been expressing my negative feelings") was likewise associated with all outcomes. Both behavioural disengagement and venting were significantly more common among people injured violently. As discussed earlier, it is possible that venting itself could be a risk factor for violence.

Self-blame ("I've been criticising myself") was significantly associated with all outcomes, and it has previously been reported to predict poor adjustment to stress (Carver, 1997). Self-blame also emerged as a theme in the qualitative analysis of the vignettes, and was found to be particularly common among people injured in road traffic accidents, and rare among those injured violently. A young woman injured in a collision said "It was my fault… pissed off with myself", and a female cyclist reflected "I was so tired… didn't see the car" (Skinner, 2014, p. 34). It is plausible that people would believe they could have behaved differently in an accident, whereas after violence, blame of others would be more common. In the quantitative measure of self-blame, however, there was no strong evidence of a difference between violent and accidental injuries.

Substance use, which refers to the use of alcohol or other drugs to help deal with a situation, showed a significant association with symptoms of acute stress and anxiety, and with appearance concern. It was telling that this relationship was significant when there was no association with hazardous levels of alcohol use on the AUDIT. During fieldwork, a number of young ethnic minority men stated that they did not drink alcohol at all, but admitted that they smoked cannabis: this may explain the apparent contradiction. Ethnic minority groups have been reported to have higher rates of misuse of substances other than alcohol; this increases the risk of violence, and is associated with higher distress (Stephens et al., 2010). However, much research has focussed on alcohol as the substance being misused. In this particular population, alcohol may be less relevant than other intoxicants. This should be considered in future research in similar populations.

Those using religion as a coping mechanism had increased odds of acute stress symptoms. Religion and spirituality are more often associated with protective effects for both mental and physical health (King et al., 2013; Wong & Kennedy, 2011), so this opposite effect was thought-provoking. The domain encompasses "praying or meditating" and "trying to find comfort in my religion or spiritual beliefs". It encompasses spiritual beliefs, which, as discussed above, can be associated with worse outcomes. In addition, some research differentiates between positive religious coping, which relates to belief in a benevolent god, and negative religious coping, which relates to belief in a punitive god. Negative religious coping has been associated with increased symptoms of PTSD in diverse trauma samples, although the authors did not speculate on the direction of this relationship (Bryant-Davis & Wong, 2013). It was not possible to separate positive from negative religious coping in the present data, however, the association with acute stress would suggest some participants were using negative religious coping. Furthermore, even positive religious coping may have limited effects on mental health; a recent meta-analysis reported that it only accounted for 1% of variance in depressive symptoms, thus calling into question the frequent reports of psychological benefits

(King et al., 2013). The authors suggest much evidence comes from North America, and may not be applicable elsewhere.

In the present study, there could be a moderating effect of religion: people of who identified with 'other' religions were significantly more likely to use religious coping mechanisms. They also had increased odds of being injured violently, and increased odds of distress, and so potentially confounded the otherwise protective effects of religion. This is reinforced by the previous finding that religious coping styles were adopted more among 'underserved' populations, that is, those with limited access to healthcare, or who were otherwise deprived or discriminated against (Bryant-Davis & Wong, 2013). As seen, the spiritual quality of life measure had surprisingly few associations with psychological outcomes, and would likewise be expected to be associated with better outcomes; it too could be affected by a confounding effect.

The use of planning (e.g. "I've been trying to come up with a strategy about what to do") was associated with increased odds of psychological distress and appearance concern. "Planning for the future" was a theme in the qualitative analysis. Neutral planning accounts related to practicalities such as where a participant would go on discharge, and who would take care of them. However, other accounts of planning were more negatively phrased. One woman was "worried this may set her back […] she may have to get rid of [her] puppy", and a man was "worried about walking again". A young woman had been planning to emigrate but was reconsidering this, including the possible negative effect of the injury on her finances. Another young woman questioned whether she would still be able to begin a planned degree course (Skinner, 2014, pp. 27–28). These accounts demonstrate the element of apprehension within the act of planning; for some, planning was linked to adverse changes to their lives.

Other significant associations were hard to interpret. Both self-distraction and using instrumental support were significantly associated with higher levels of appearance concern. The former deals with using activities such as work, reading or watching TV to take one's mind off things, and is another form of avoidance coping; as shown above, these have been associated with distress (Littleton et al., 2007). Using instrumental support includes items like "I've been trying to get advice or help from other people about what to do". It is not immediately clear why this would be associated with appearance concern in particular. It may have singled out those people who also had negative social support, in the sense that they may have been trying but failing to get advice, and who also had worse psychological outcomes. These ambiguous associations with appearance concern may be spurious. The findings underscore the limitations of questionnaire data; further qualitative interviews would enable more detailed exploration.

Disfigurement

Participants' own ratings of disfigurement were associated with symptoms of acute stress, depression and anxiety, and with appearance concern. This supported the idea that subjective ratings have more bearing on psychological outcomes than objective ones. However, there was an association between surgeons' (objective) ratings and depressive symptoms, albeit on a reduced sample. Therefore, objective severity may have some influence on psychological state, although other factors appear to be more important.

Childhood trauma

Associations between childhood trauma and psychological distress were evident. Physical neglect, which includes items like “I had to wear dirty clothes” and “I didn’t have enough to eat”, played a particularly strong role and was associated with worse outcomes on all measures. Emotional neglect was associated with depressive symptoms and appearance concern, while emotional abuse was associated with anxiety symptoms. The overall score for childhood trauma was associated with symptoms of acute stress and anxiety, as well as appearance concern.

The association between childhood trauma and depressive symptoms appears to be a novel finding in trauma samples. The effect was observed in the measures of physical and emotional neglect, and was not in evidence for the overall childhood trauma score. Previous research has reported associations between childhood adversity and PTSS in trauma patients (Brewin et al., 2000), and there are known associations between childhood adversity and depression in other populations. Patients with major depressive disorder have been reported to have experienced more severe emotional abuse, emotional neglect, and physical abuse than matched controls, and also experienced more comorbid psychological disorders (Bernet & Stein, 1999). Early experiences of abuse are believed to be a risk factor for depression. Given the comorbidity of symptoms in the present sample, this highlights a potential accumulation of risk factors for vulnerable patients.

The associations with anxiety and appearance concern are also believed to be novel. However, the high prevalence of anxiety suggests associations may lack sensitivity, and appearance concern may be significant because of its overlap with psychological distress.

The mixed patterns in the present study, with some types of childhood trauma affecting some outcomes, may reflect the relatively small sample, and need to be explored further. However, there was clearly a general association between childhood trauma and distress, including depressive symptoms.

5.7 Key findings

Prevalence and Hypotheses I and II

- Violent injury was associated with baseline PTSS, depressive symptoms and appearance concern, supporting Hypothesis I.
- There was no significant evidence to support Hypothesis II, that facial injury would be associated with worse outcomes.
- Strong associations were observed between all the outcome measures, indicating comorbidity of symptoms.

Demographic factors

- There were distinct differences according to demographic group. Subtle differences emphasised the importance of retaining as much specificity as possible. This was especially true in variables for ethnicity and religion.
- Unemployment, low education and low income were all associated with worse outcomes to some extent. These are all indicators of low socio-economic status.

Hypothesis III

- As predicted, worse psychological outcomes were associated with a past history of mental health problems, low wellbeing, poor quality of life, negative aspects of social support, childhood trauma, and traumatic life events.
- However, there was no evidence of the predicted associations with alcohol misuse or positive social support.
- These explanatory accentuated the complex nature of vulnerability to distress.

6 Prospective study results III: longitudinal analyses

The longitudinal data are considered. Firstly, the associations between the psychological outcomes are assessed prospectively. Secondly, Hypothesis I is evaluated in a series of adjusted multilevel models, assessing whether violence remained associated with worse outcomes after adjusting for other factors.

6.1 Univariate prospective models

At baseline, the strongest associations for each psychological outcome were with the other psychological outcomes, indicating high comorbidity. These psychological covariates could not be included in the models that tested the hypotheses: the collinearity of the variables resulted in meaningless data with very wide confidence intervals. None the less, baseline distress was likely to be a strong predictor of later distress, based on the univariate associations. The series of models in this section takes each psychological outcome in turn, to assess the contribution of baseline distress to follow-up distress. Six-month data were used as longer-term outcomes are more useful clinically.

6.1.1 The role of baseline distress in predicting longer-term outcomes

Throughout these analyses, confidence intervals are often wide. This reflects the high comorbidity between symptoms, and the findings need to be treated with caution.

Table 54 shows the role of baseline psychological outcomes in predicting PTSS at six months.

Table 54: Univariate associations between PTSS (PCL-S≥44) at six months, and baseline psychological outcomes. *p<.05 **p<.01 ***p<.001.

Baseline symptoms (n)	Values (n)	% PTSS	OR	[95% CI]
Acute stress (111)	Low (90)	17.8		
	High (21)	66.7	9.25***	[3.22,26.59]
Depression (110)	Low (85)	16.5		
	High (25)	60.0	7.61***	[2.84,20.36]
Anxiety (112)	Low (75)	16.0		
	High (37)	48.7	4.97***	[2.04,12.14]
Appearance concern (107)	Lowest tertile (42)	9.5		
	Mid tertile (38)	26.3	3.39	[0.96,11.94]
	Upper tertile (27)	55.6	11.87***	[3.30,42.70]

There were highly significant associations between PTSS and all baseline measures of psychological distress, as well as appearance concern. The prevalence of PTSS was highest amongst those with high symptoms of acute stress at baseline, two thirds of whom had significant symptoms at six months.

In Table 55, depressive symptoms at six months are shown in relation to baseline outcome measures.

Table 55: Univariate associations between depressive symptoms (HADS-D ≥8) at six months, and baseline psychological outcomes. *p<.05 **p<.01 ***p<.001.

Baseline symptoms (n)	Values (n)	% Dep	OR	[95% CI]
Acute stress (111)	Low (90)	24.4		
	High (21)	61.9	5.02**	[1.84,13.70]
Depression (110)	Low (85)	20.0		
	High (25)	68.0	8.50***	[3.14,22.97]
Anxiety (112)	Low (75)	25.3		
	High (37)	43.2	2.25	[0.98,5.17]
Appearance concern (107)	Lowest tertile (42)	21.4		
	Mid tertile (38)	29.0	1.49	[0.54,4.13]
	Upper tertile (27)	51.9	3.95*	[1.37,11.34]

Depressive symptoms at baseline strongly predicted symptoms at six months, with two thirds still experiencing significant symptoms. High levels of acute stress or appearance concern at baseline were also associated with depressive symptoms at six months.

Associations between baseline psychological outcomes and anxiety symptoms at six months are presented in Table 56.

Table 56: Univariate associations between anxiety symptoms (HADS-A ≥8) at six months, and baseline psychological outcomes. *p<.05 **p<.01 ***p<.001.

Baseline symptoms (n)	Values (n)	% Anx	OR	[95% CI]
Acute stress (111)	Low (90)	32.2		
	High (21)	66.7	4.21**	[1.53,11.54]
Depression (110)	Low (85)	30.6		
	High (25)	64.0	4.03**	[1.58,10.31]
Anxiety (112)	Low (75)	26.7		
	High (37)	62.2	4.52***	[1.95,10.45]
Appearance concern (107)	Lowest tertile (42)	14.3		
	Mid tertile (38)	44.7	4.86**	[1.66,14.23]
	Upper tertile (27)	63.0	10.20***	[3.18,32.70]

Baseline anxiety was strongly associated with anxiety at six months. However, there were significant associations with the three other outcomes as well.

Table 57 presents associations for appearance concern at six months, with the psychological variables at baseline.

Table 57: Univariate associations between appearance concern at six months (DAS24), and baseline psychological outcomes. *p<.05 **p<.01 ***p<.001.

Baseline symptoms (n)	Values (n)	Coefficient	[95% CI]
Acute stress (97)	Low (78)	0.0	
	High (19)	14.69***	[7.75,21.62]
Depression (96)	Low (76)	0.0	
	High (20)	13.14**	[5.33,20.96]
Anxiety (98)	Low (65)	0.0	
	High (33)	14.28***	[8.08,20.48]
Appearance concern (93)	Lowest tertile (36)	0.0	
	Mid tertile (34)	8.61***	[3.79,13.42]
	Upper tertile (23)	19.62***	[11.31,27.93]

All baseline measures were strongly associated with appearance concern at six months, with the strongest association being scores in the upper tertile of appearance concern.

The wide confidence intervals prevented any meaningful adjustment of these analyses. It also prevented these variables from being included in adjusted models testing the hypotheses.

6.1.2 Associations between number of life events (LTE) and psychological symptoms

The number of traumatic life events was coded into none, one, or two or more to apply univariate analyses. These examined the increased odds of psychological distress (symptoms of PTSD, depression or anxiety) with an increased number of events, as shown in Table 58. The questionnaire on recent traumatic events was collected at three months and is phrased to ask about events in the past six months, hence associations are only reported for follow-up outcomes.

Table 58: Logistic regression on effect of number of recent traumatic life events (LTE) on clinically significant psychological distress. *p<.05 **p<.01 ***p<.001

Outcome	No. of events	OR [95% CI]
PTSS: three months (92)	None (40)	1
	One (28)	1.23 [0.34,4.52]
	Two+ (24)	4.79** [1.47,15.64]
PTSS: six months (89)	None (38)	1
	One (28)	0.89 [0.23,3.50]
	Two+ (23)	4.10* [1.24,13.62]
Depressive symptoms: three months (92)	None (40)	1
	One (28)	1.55 [0.44,5.41]
	Two+ (24)	3.40* [1.03,11.27]
Depressive symptoms: six months (89)	None (38)	1
	One (28)	1.78 [0.58,5.40]
	Two+ (23)	2.00 [0.63,6.38]
Anxiety symptoms: three months (92)	None (40)	1
	One (28)	0.82 [0.26,2.59]
	Two+ (24)	3.00* [1.03,8.78]
Anxiety symptoms: six months (89)	None (38)	1
	One (28)	0.98 [0.33,2.89]
	Two+ (23)	3.82* [1.28,11.38]

There were no significant differences in distress between people who experienced no traumatic events, and people who experienced one. However, people who had experienced two or more traumatic events had significantly higher odds of PTSS and depressive and anxiety symptoms, compared with those who experienced no events. This effect was evident in three and six month responses. The only exception was depression at six months: although there remained a tendency for more distress after more events, it was non-significant.

6.2 Background to multilevel modelling

Because the data were clustered, with each person likely to have similar results at each wave, I decided to apply multilevel modelling. This method allows the data to be clustered by participant. Each person's results will vary from the group mean, and that person's repeated results over time are likely to vary in the same way. Multilevel modelling for repeated measures allows for this natural variation to be accommodated in the model. Here, the variable levels were i) wave and ii) individual. The fixed part of the model was the hypothesised predictor variable, i.e. violent or facial injury.

Multilevel modelling also allowed maximal use of the data: rather than using the distinctly biased follow up sample alone (which included relatively few people injured violently or experiencing distress, among other biases), the baseline sample could be included. Multilevel models were able to take account of the full baseline sample, and were therefore more representative of the clinical sample. Each individual could be included, whether they had contributed to one, two or all three waves. Other longitudinal methods would have been limited to the complete cases that responded at follow-up. This also increased statistical power considerably.

The multilevel linear regressions could not use robust regression adjustments; in place of this, bootstrapping was used. This resamples the same sample a given number of times to average out any extreme values, and produce confidence intervals that are more robust.

Throughout these analyses, confidence intervals are often wide, and the findings need to be treated with caution.

6.3 The role of violent injury in predicting distress

This series of analyses tests the hypothesis that violent injury is associated with PTSS, depressive and anxiety symptoms, and appearance concern.

The adjusted models were built up based on significant univariate associations at baseline, as these would be the most clinically useful factors. Variables with significant associations at baseline were entered into the models in the following order: a) physical variables, b) demographic variables and c) psychosocial variables. Within these groups, variables were entered in order of significance. The exceptions were:

- The models on psychological distress (symptoms of PTSS, depression or anxiety) were not adjusted for baseline measures of other psychological outcomes. The high comorbidity led to collinearity and meaningless results. For example, PTSS and depressive symptoms were highly comorbid in the sample; therefore, the PTSS model was not adjusted for depressive symptoms, or vice versa.
- Polytrauma was excluded from the model despite some significant associations at baseline, because data were only available from a reduced number of participants and this substantially reduced the power of the models.
- To avoid over-adjustment, models were only adjusted for religion, not ethnicity. Religion had markedly stronger associations at baseline relative to ethnicity, and somewhat larger subgroups. There was evidence at baseline of different ethnic vulnerabilities, with different ethnic groups at increased odds of the various outcomes. However, the models were not powered to explore ethnicity's smaller groups.
- To avoid over-adjustment of factors related to income and deprivation, models were only adjusted for employment, and not for education or income. Employment was more often significantly associated in the univariate analyses, and was available from a larger sample.
- The only psychological variable entered in the models was past mental health. Outcome variables could not be included, but past mental health is likely to have acted as a proxy for them: it was strongly associated with psychological distress, but not to the extent that it produced collinearity. After adding this to models, the large confidence intervals prevented further meaningful adjustments, including adding more psychosocial variables.

At each stage that a variable was added, the models were subjected to a likelihood ratio test after estimation to ensure that this new model was modelling the variation better than the last: if it was not significant, the most recently added variable was removed from the model before proceeding.

Throughout the analyses, the models were adjusted for number of days since the traumatic event. The longitudinal panel data labelled follow-up as occurring at three months and six months, but the reality was that they were much more spread out. This adjustment corrected for any variation arising from this. 'Days since event' was not significantly associated with any outcomes; however, the relationship between outcomes and other variables might be affected by days since event.

The models were also adjusted for age and gender. If these reached significance, they were presented in the models.

6.3.1 Adjusted models for PTSS and violence

In this longitudinal analysis, the PTSS cut-off variable uses ASDS cut-off data at baseline and PCL-S cut-off data at follow up. The models were underpowered without making use of this baseline data, and using all three waves made adjusted multivariate analyses possible. However, there were drawbacks in that ASD and PTSD are not the same condition, although they share symptoms. They were measured here with different questionnaires, so in combining them a strong assumption is made.

Nevertheless, this assumption is justified by the data. The relationship between ASD symptoms and PTSS in this sample is discussed in 3.3.3.2; ASDS was a reasonable predictor of PCL-S outcomes. The predictive power of ASD in this sample compares well with the studies summarised by Bryant (Bryant, 2011). The relationship between the two is comparable to that between baseline and follow-up HADS-D. Furthermore, adding the time elapsed had almost no effect on the model, further suggesting there is little change over time.

The steps in building the PTSS model are detailed below:

- Violence was a strongly significant predictor of PTSS after adjusting for days since event, age and gender.
- Religion was added to the model and 'other' religion proved a highly significant predictor of PTSS relative to the reference group, while violence remained significant. Religion had large confidence intervals; however, it was retained. The LR test indicated this model had an improved fit. Gender became significant at this stage, with women at increased odds of PTSS.
- Past mental health was added to the model: it was highly significant and violence remained significant.

The adjusted model is presented in Table 59.

Table 59: Adjusted multilevel model for clinically significant PTSS (ASDS ≥56, PCL-S scores ≥45). *p<.05 **p<.01 ***p<.001. Adjusted for days since event and age

Variable (n)	Values (n)	Adjusted OR [95% CI]		Adjusted OR [95% CI]		Adjusted OR [95% CI]	
Mechanism of injury (379)	Accidental (270)	1		1		1	
	Violent (109)	6.88**	[1.81,26.13]	5.78**	[1.57,21.31]	6.44**	[1.75,23.75]
Gender (379)	Male (278)	1		1		1	
	Female (101)	3.69	[0.98,13.87]	4.48*	[1.19,16.90]	2.70	[0.74,9.81]
Religion (379)	No religion (166)			1		1	
	Christian (174)			1.44	[0.41,5.06]	1.38	[0.40,4.71]
	Other (39)			9.51*	[1.58,57.24]	13.86**	[2.20,87.29]
Past mental health (379)	No history (229)					1	
	History (150)					7.91**	[2.22,28.24]
p value of likelihood ratio test after estimation				0.0345		0.0003	

Violence played a significant role in predicting PTSS in this sample, although religion (belonging to the 'other' religious group) and past mental health were stronger predictors.

Additional analyses

The above analysis treated ASDS and PCL-S scores as continuous, limiting the conclusions that can be drawn. It also meant causality could not be discussed. To tackle this, the same analysis was carried out without adding baseline ASD into the PTSS variable, i.e. using only follow up PTSD measures. No conclusions could be drawn as the odds ratios were high and confidence intervals very wide. However, the pattern of results was the same as in the model that included acute stress. This analysis is provided in Appendix 9.7.

The model presented above began with the hypothesis that violence was the strongest predictor. Although it was significant, other factors were stronger. This raised the question of whether, if violence were entered into the model later, it might not reach significance. For example, other demographic factors might fit the model better. Although this would be a digression from testing Hypothesis I, it might produce clinically important information. This possibility was explored in an adjusted model, described in Appendix 9.7: it led to exactly the same outcome as is presented above.

6.3.2 Adjusted models for depressive symptoms and violence

The steps in building the depressive symptoms model are detailed below.

- Violence significantly increased the odds of experiencing depressive symptoms, after adjusting for days since event, age and gender.
- Religion was added and ‘other’ religion was significantly associated with depressive symptoms, relative to the reference group; the LR test indicated this model was an improvement.
- Employment status was added, but was removed, as the LR test indicated it did not improve the model.
- Past mental health was added to the model and was significantly associated; violence remained significant.

Table 60 presents the adjusted multilevel model for depressive symptoms and violence.

Table 60: Adjusted multilevel model for depression caseness (HADS-D ≥8). *p<.05 **p<.01 ***p<.001. Adjusted for days since event and age.

Variable (n)	Values (n)	Adjusted OR [95% CI]		Adjusted OR [95% CI]		Adjusted OR [95% CI]	
Mechanism of injury (379)	Accidental (269)	1		1		1	
	Violent (110)	4.36*	[1.32,14.40]	4.24*	[1.27,14.16]	4.78*	[1.41,16.18]
Gender (379)	Male (279)	1		1		1	
	Female (100)	3.87*	[1.12,13.39]	4.82*	[1.36,17.15]	3.41	[0.96,12.09]
Religion (379)	No religion (166)			1		1	
	Christian (174)			0.59	[0.19,1.88]	0.59	[0.19,1.89]
	Other (39)			12.06**	[2.07,70.35]	15.93**	[2.60,97.62]
Past mental health (379)	No history (230)					1	
	History (149)					4.55*	[1.43,14.46]
p value of likelihood ratio test after estimation				0.0014		0.0057	

- Likelihood ratio test after estimation was non-significant at 5% for employment status.

Violence significantly predicted depressive symptoms in this sample. However, belonging to a minority religion had a stronger effect, albeit with wide confidence intervals. Past mental health was a significant predictor in the adjusted model.

6.3.3 Adjusted models for anxiety symptoms and violence

In the univariate analyses, violence did not significantly increase the odds of experiencing anxiety symptoms; this did not change when the model was adjusted for days since event, age and gender.

However, a model was built to understand what factors were associated with anxiety symptoms, as this information could prove clinically useful. The steps were as follows.

- Employment status was added to the model: being unemployed significantly increased the odds of anxiety symptoms relative to the employed reference group, after adjusting for days, age and gender. Age was also significant in the model.
- Religion was added to the model, but was removed, as it did not improve the model.
- Past history of mental health was added to the model and improved the fit.

The final model is shown in Table 61.

Table 61: Adjusted multilevel model for anxiety caseness (HADS-A ≥8). *p<.05 **p<.01 ***p<.001. Adjusted for days since event, gender and age.

Variable (n)	Values (n)	Adjusted OR [95% CI]		Adjusted OR [95% CI]	
Age (410)		0.95**	[0.92,0.98]	0.95**	[0.92,0.98]
Employment status (410)	Employed (288)	1		1	
	Student, homemaker (31)	0.96	[0.23,4.07]	1.00	[0.24,4.18]
	Unemployed (38)	9.44**	[2.41,37.07]	8.21**	[2.13,31.71]
	Retired, sick (38)	3.3	[0.75,14.58]	3.75	[0.85,16.57]
Past mental health (410)	No history (250)			1	
	History (160)			2.46*	[1.06,5.69]
p value of likelihood ratio test after estimation				0.0258	

- Likelihood ratio tests after estimation were non-significant at 5% for religion.

Violent injury did not predict anxiety symptoms in this sample. However, age was significant in the adjusted model, with increasing age associated with reduced odds of anxiety symptoms. Being unemployed and having a history of mental illness were also associated with high anxiety symptoms.

6.3.4 Adjusted models for appearance concern and violence

A different approach was used for the DAS24, as the authors advise against dichotomising it. A multilevel regression was used, with bootstrapping to increase the robustness. The process of building the model is detailed below. At each stage, an LR test was conducted.

- In a multilevel regression model, violence significantly increased the level of appearance concern; this held true after adjusting the model for 'days since event', gender and age. Age and gender were themselves significant.
- Head injury was significant when added to the model, and was retained.
- Employment was added but did not improve the model; it was removed.
- Religion was added to the model and improved the model.
- Past mental health was added.

The final model is provided in Table 62.

Table 62: Adjusted multilevel model for appearance concern (DAS24). *p<.05 **p<.01 ***p<.001. Adjusted for days since event, gender and age.

		Adjusted		Adjusted	
Variable (n)	**Values (n)**	**Coefficient**	**[95% CI]**	**Coefficient**	**[95% CI]**
Mechanism of injury (364)	Accidental (281)	0.0		0.0	
	Violent (109)	3.15*	[0.22,6.07]	2.78*	[0.09,5.47]
Gender (364)	Male (287)	0.0		0.0	
	Female (103)	7.63***	[4.77,10.49]	6.20***	[3.90,8.50]
Age (364)		-0.29***	[-0.38,-0.20]	-0.26***	[-0.32,-0.19]
Head Injury (364)	No known H.I. (262)			0.0	
	HI (128)			-4.73***	[-6.90,-2.56]
Religion (364)	No religion (159)			0.0	
	Christian (176)			0.62	[-0.97,2.21]
	Other (233)			8.47***	[4.30,12.65]
Past mental health (364)	No history (233)			0.0	
	History (155)			6.95***	[4.71,9.19]
p value of likelihood ratio test after estimation				0.0000	

- Likelihood ratio tests after estimation were non-significant at 5% for employment.

Violence remained significantly associated with appearance concern, after adjusting for other significant factors. Being female and belonging to the 'other' religion category were the strongest predictors, along with age: older age was associated with less appearance concern. People whose injury included a head injury had significantly lower levels of appearance concern.

6.4 Facial injury hypothesis

There was no significant evidence of associations with facial injury at baseline. However, having seen in the previous models that gender became temporarily significant after adjusting for other factors, I wanted to check whether there were effects of facial injury that were being obscured.

Facial injury and PTSS, depressive and anxiety symptoms.

A model with PTSS as the outcome was adjusted for days since event, gender and age; facial injury was added, but it remained non-significant. This was repeated for depressive and anxiety symptoms: it did not affect the results for these outcomes either.

Facial injury and appearance concern

In a univariate regression where appearance concern was analysed continuously, there was no significant evidence that injury site had an effect on levels of appearance concern. This remained true when the model was adjusted for days since event, gender and age.

Head injury was a possible confounder: head injuries were significantly more common among those with facial injuries, and head injuries were associated with lower levels of appearance concern. However, in a regression model adjusted for head injury, site of injury remained non-significant.

In this sample, there was no strong evidence of any effect of facial injury.

6.5 Results III discussion

6.5.1 Prospective models

The role of baseline distress in longer-term outcomes

There were highly significant between all baseline outcomes, and the same outcomes at six months. Among the measures of distress, acute stress increased the odds of PTSS most markedly (*OR* 9.25, *CI* 3.22 to 26.59). This added weight to the reasonably strong predictive power of acute stress in this sample. Similarly, depressive symptoms at six months had the highest level of increased odds among people with high baseline depression (*OR* 8.50, *CI* 3.14 to 22.97). This pattern was less evident in anxiety symptoms, which had more diffuse associations. All baseline measures of distress had similar levels of predictive power for six-month appearance concern.

List of threatening experiences (LTE)

As participants completed the LTE at three months and answered about recent events, the data were considered prospectively. People who had experienced two or more traumatic events in the past six months had significantly increased odds of PTSS and anxiety symptoms at both three and six months, and of depressive symptoms at three months. Previous research has shown a cumulative effect of number of traumatic events on the odds of experiencing PTSS (Frissa et al., 2013). In this sample, the effect was wider, and was associated with increased odds of depressive and anxiety symptoms as well. However, the reverse has also been observed; that past or current psychological disorders increase the risk of subsequent injury and traumatic events (Breslau et al., 2000). According to that theory, people presenting to hospital after injury would have pre-existing psychological symptoms, increasing the likelihood of post-injury distress. Whatever the direction of the relationship, traumatic events were clearly associated with poor outcomes in this sample.

6.5.2 Multilevel models

The adjusted models testing Hypothesis I are discussed in this section.

A clear limitation of these models is that some variables had wide confidence intervals. This is due to the small sample sizes in subgroups and particularly affected religion. As a result, the findings of the models should be treated with caution.

The PTSS model was carried out with the assumption that the ASDS and PCL-S measured the same symptoms, a limitation which has been discussed. An alternative model based only on the PCL-S at follow-up produced the same pattern of findings, but was underpowered.

6.5.2.1 Violent injury hypothesis

PTSS

Violent injury remained a significant risk factor for PTSS after adjusting for other significant variables, supporting Hypothesis I. Violent injury increased the odds of PTSS by a factor of six (*OR* 6.44, *CI* 1.75 to 23.75). However, other explanatory variables had a stronger relationship with PTSS. The 'other' religion category increased the odds of PTSS most markedly (*OR* 13.86, *CI* 2.20 to 87.29). This was an interesting finding but required careful interpretation, both conceptually and because of the wide confidence interval. The 'other' religious group was somewhat heterogeneous; although it included a majority of Muslims (69%) it also comprised people of other non-Christian faiths. The common factor is that in the UK, these minority faiths are typically associated with minority ethnic status; a significant association between religion and ethnicity was also observed in the present sample. While the literature included few findings specifically about religion, ethnicity was more commonly discussed. This builds on the growing evidence in the present study that there are risk factors pertaining to ethnic minority status. People in the 'other' religious group had slightly but not significantly increased odds of being violently injured in the first place, whereas people of Black or Asian ethnicity had significantly increased odds of experiencing violence. There appears to be a common pathway of risk for people of ethnic minority status, which leads to increased risk of violence as well as increased odds of PTSS following injury.

Interestingly, people in the 'other' religious group were significantly more likely to use religious coping styles. This may explain the significant association between religious coping styles and acute stress symptoms.

A past history of mental health problems increased the odds of PTSS by a factor of eight (*OR* 7.91, *CI* 2.22 to 28.24). This finding was in accordance with previous literature (Brewin et al., 2000; Glynn et al., 2003). It highlights the relevance of past mental health in understanding current distress.

Gender, which had not been significant in the univariate results, became temporarily significant after adjusting for religion, however, the effect disappeared again when past mental health was added to the model. This suggests there is a level of increased vulnerability among women, but that the effect is mediated by past mental health. Women in the general population are known to be at higher risk of depression and anxiety (Kendler, 1996; Plomin et al., 2008), and women in the present sample were significantly more likely to report a past history of mental health. Some previous studies have

reported that women were more vulnerable to PTSS as well as other psychological disorders, although others have not found this to be true (Brewin et al., 2000; Glynn et al., 2003).

The vignette analysis offered compelling accounts that served to illustrate the highly traumatic nature of violent injury. Participants described stab wounds that "felt like a punch in the chest" (male, 36), and a gunshot wound "was like ringing in your head, but I felt it in my leg" (male, 24). Some felt that they might die. A 25-year-old male who was stabbed said he was "Very scared, didn't know if I was going to live or die", and after being shot, a 36-year-old male stated, "I felt I will die in this moment, nothing else". A 19-year-old man who was stabbed described the events, and his friends' reactions, thus: "They knew my breathing was tight, and I'm slowly dying […] I slowly started giving up" (Skinner, 2014, p. 35). Believing your life is in danger is known to predict PTSD, after injury and assault (Holbrook et al., 2001; Kenardy et al., 2014).

Depressive and anxiety symptoms

Violence remained associated with depressive symptoms (*OR* 4.78, *CI* 1.41 to 16.18), as predicted in Hypothesis I. The 'other' religion group again had markedly increased odds of depressive symptoms compared with the 'no religion' group (*OR* 15.93, *CI* 2.60 to 97.62).

Past mental health considerably increased the odds of depressive symptoms (*OR* 4.55, *CI* 1.43 to 14.46). This was in keeping with expectations. Depression is an episodic condition, and those who have experienced symptoms in the past are more likely to experience symptoms after a trigger like a traumatic event (Mason et al., 2002; Steel et al., 2011).

Women had significantly increased odds of depressive symptoms when the model was adjusted for age and days since event. However, as in the PTSS model, gender ceased to be significant once the model was adjusted for past mental health.

There was no association between violent injury and anxiety symptoms in the adjusted model. People who were unemployed were at the highest risk of anxiety symptoms (*OR* 8.21, *CI* 2.13 to 31.71), relative to the employed group. Past mental health also had a role in predicting anxiety (*OR* 2.46, *CI* 1.06 to 5.69). Older age had a protective effect (*OR* 0.95, *CI* 0.92 to 0.98).

Appearance concern

In the adjusted model, violence remained significantly associated with appearance concern (β 2.78, *CI* 0.09 to 5.47), supporting Hypothesis I. Gender had significant associations, with women experiencing higher levels of concern (β = 6.20, *CI* 3.90 to 8.50). There was also an effect of age, with increasing age being protective (β = -0.26, *CI* -0.32 to -0.19). This accords with some appearance

research in other populations, where younger women have been shown to have elevated levels of appearance concern (Carr et al., 2005; Rumsey & Harcourt, 2004).

As in the PTSS and depressive models, there was a significant role for the 'other' religion group (β = 8.47, *CI* 4.30 to 12.65), and past mental health (β = 6.95, *CI* 4.71 to 9.19).

Unexpectedly, head injury remained significantly associated with lower levels of appearance concern in the adjusted model (β = -4.73, *CI* -6.90 to -2.56). This association appears to be novel, and I offer hypotheses tentatively. One possibility is that following head injury, people experience greater apathy: apathetic personality type is a recognised sequela of traumatic brain injury, and is characterised by impairment to motivation and emotional reactivity (Starkstein & Pahissa, 2014). Those with head injuries in this sample could reasonably be assumed to have mild traumatic brain injury, and increased apathy would lead to lower levels of concern about appearance. Apathy after traumatic brain injury has been reported to be associated with reduced depressive symptoms (Starkstein & Pahissa, 2014), and there was a significant univariate association between head injury and reduced odds of depressive symptoms in the present study (*OR* 0.45, *CI* 0.22 to 0.92), which would support this tentative hypothesis. These effects are usually transient, and the lack of appearance concern might therefore change over a longer period.

Another possibility is suggested by findings from Bryant et al (Bryant et al., 2010) in a paper comparing outcomes in trauma patients with and without mild traumatic brain injury. They suggested that damage to the neural networks associated with fear and anxiety, located in frontal areas of the brain, could lead to psychological differences. However, in their sample this damage led to *increased* psychological sequelae, including PTSD, panic disorder, agoraphobia and social phobia.

6.5.2.2 Facial injury hypothesis

There were no significant differences in outcomes according to site of injury, refuting Hypothesis II, which stated that facial injury would be associated with worse outcomes. There was limited precedence in the literature that was reviewed; as discussed, no studies were found that made this comparison. In past studies, prevalence of psychological distress appeared to be somewhat higher after facial injury, but the prevalence varied widely in both facial and major trauma samples. Facial injuries were expected to place a greater psychosocial burden on people, but this did not appear to be the case. This corresponds to a general finding that physical variables have a limited role in psychological outcomes, compared with demographic and psychological factors.

Lower levels of appearance concern following head and face disfigurement, compared with body disfigurement, have been reported in one previous study (Carr et al., 2005), however, it had limited comparability with the present sample.

6.6 Key findings

Hypothesis I

- Violent injury was a significant risk factor for PTSS, depressive symptoms and appearance concern, after adjusting for other significant covariates.
- There was no significant evidence of an association with anxiety.

Hypothesis II

- There was no significant evidence to support the hypothesis that facial injuries would be associated with worse outcomes.

Hypothesis III

- A past history of mental health problems was one of the strongest predictors of current psychological distress.

Demographic factors

- People in the 'other' religious group had increased odds of PTSS, depressive symptoms and anxiety. This strong effect required careful interpretation. It is likely to reflect minority status.
- There was evidence that being female was associated with higher levels of appearance concern.

7 General discussion

The findings from all analyses are drawn together here to appraise the study hypotheses. I draw broader conclusions and relate the findings to previous research. The approach used in this study is critically considered to identify strengths and limitations. Implications for future clinical practice and research are proposed.

In this study of psychological outcomes after trauma, the most striking finding was that psychological and sociodemographic factors had a much stronger role in psychological outcomes than physical factors. This agrees with much of the literature (Alarcon et al., 2012; Weaver & Clum, 1995). The prevalence of distress was high and there was substantial comorbidity of symptoms; having distress on any measure strongly increased the odds of distress on other measures. As predicted, violence played a significant role in predicting worse psychological outcomes; however, there was no significant effect of facial injury. In the univariate analyses, factors associated with deprivation and ethnic minority status were among the variables most associated with psychological distress. In the adjusted models, a history of mental ill health was a strong predictor of distress. There was also an apparent strong effect of identifying with a minority religion. Levels of appearance concern in this sample were similar to those of the general population.

7.1 The prevalence of distress was high and symptoms were comorbid

Psychological distress was high overall in this sample, with the prevalence of post-traumatic, depressive and anxiety symptoms all markedly higher than the general population. Around a quarter of participants experienced clinically significant symptoms of PTSS at each wave of the prospective study; in comparison, 5.5% of a community sample had current symptoms of PTSD (Frissa et al., 2013). Up to a third of participants had clinically significant symptoms of depression; roughly three times more than the general population prevalence of 11.4% (Crawford & Henry, 2001). The prevalence of anxiety symptoms was the highest among the three measures of psychological distress, ranging from 38.4% to 47.4%, but was also closer to the general population level of 33.2% (Crawford & Henry, 2001).

The present findings fall within the range seen in previous studies although, as discussed in the literature review, the reported estimates vary widely. A review found PTSS rates between 17.5% and 42% (O'Donnell et al., 2003), although most studies find between a quarter and a third of people are affected (Haagsma et al., 2011; Shih & Schell, 2010; Zatzick et al., 2007). In facial trauma patients, past research has reported prevalences of PTSS similar to those seen in general trauma.

The high rates of depressive symptoms observed here challenge the common perception that PTSD is the main or most important psychological consequence of trauma. Indeed, the prevalence of depressive symptoms was higher than that of PTSS at each wave of the prospective study. Furthermore, although there was comorbidity of symptoms, depressive symptoms also occurred in the absence of PTSS.

Anxiety been studied relatively little in past research, and studies produced varied estimates, so there are limited comparisons for the high rates seen in this sample. In the general population, rates of anxiety are higher than those of depression, so it is not surprising to see the same pattern here. However, almost half of the trauma patients continued to have significant symptoms at six months, and that even this figure may be an underestimation given the reduced follow-up among those with distress.

Among the strongest associations in the study was the fact that having symptoms of PTSS, depression or anxiety increased the odds of symptoms on other measures at baseline by a factor of seven. Significant baseline symptoms were a strong predictor of follow-up symptoms. Comorbidity has been reported in trauma patients before, and up to 85% of civilians with PTSD have additional, comorbid psychiatric conditions (O'Donnell et al., 2003). Comorbid conditions may complicate the course of recovery and require more complex treatment.

Depressive and anxiety symptoms often co-occur, as seen in this study. The symptoms reported in the study are likely to reflect pre-existing symptoms, as the HADS questionnaire asks participants to think about the past two weeks. The high prevalence of a history of mental health problems reflects the on-going nature of these conditions; depression usually has a slow onset over several weeks. In contrast, post-traumatic symptoms have a sudden onset, but people with existing disorders including depression and anxiety are at greater risk, which goes some way to explaining the comorbidity here. While the DSM positions acute stress as an early form of PTSD, the WHO's International Classification of Diseases (ICD) takes a different view, that it is associated with depressive and anxiety symptoms as well as post-traumatic symptoms (Bryant, 2011): this reflects the findings of this study.

There was no pattern of prevalence decreasing over time: the prevalence of PTSS, depressive and anxiety symptoms was the same or higher at six months. Baseline symptoms on each measure were significantly associated with symptoms at six months on the same measure. The pilot results indicate that, despite the high prevalence of distress, patients' psychological needs were rarely addressed, and the high prevalence at follow-up corroborates this. This contradicts most previous research, where prevalence typically decreases over time. However, some previous studies have reported that distress remains high, rather than declining, particularly among victims of violence (Bryant, O'Donnell, et al., 2010; Johansen, Wahl, & Weisaeth, 2008). If anything, prevalence at follow-up may be underestimated in this study, due to the lower follow-up rates among people with high baseline distress. Reduced samples at follow-up are common in trauma research, and it is possible that this is behind the decline in prevalence reported in some other studies.

Despite high levels of psychological distress, participants in the pilot study were unlikely to have sought emotional support, or even to recognise that they night need it. However, the majority were willing to speak to a professional if this were recommended. There is a clear need for regular screening for distress among trauma patients.

7.2 The site of injury did not affect psychological outcomes

People with facial injuries did not have a significantly increased risk of psychological distress or appearance concern, in contrast to the study's hypothesis. Although the pilot study showed a comparatively high prevalence of PTSS among facial trauma outpatients, the main study revealed no significant differences, even on the robust sample at baseline. Although it contradicted expectations, this finding underlines the importance of psychological and sociodemographic factors in psychological outcomes. Facial injury was expected to tap into psychosocial concerns, through increased visibility of injuries and fears of social judgement, but this was not supported by the data. Facial injuries did have serious psychological sequelae: however, they did not differ significantly in severity from those seen in major trauma patients.

No other studies were found that made the comparison between psychological outcomes following facial versus non-facial injuries. On the evidence of this sample, it can be concluded that there are no significant differences. It is possible that large studies of trauma patients have analysed their sample according to different sites of injury, but that these analyses were not reported because they were non-significant. Having said that, none of the research reviewed gave any indication of this.

The lack of association between appearance concern and facial injury is discussed in section 7.6.

7.3 Violent injury was associated with PTSS and depressive symptoms

There was a significant association between violent injury and PTSS. The PTSS finding confirms findings from previous studies (Alarcon et al., 2012; Lim et al., 2012; Shih & Schell, 2010). One previous study found that violent injury was associated with depressive symptoms (DeRoon-Cassini, Mancini, Rusch, & Bonanno, 2010). One previous study reported that the prevalence of PTSD did not decline for victims of violence (Johansen et al., 2008). This adds weight to the possibility that PTSS at follow-up was underestimated in the present sample, and would have been higher still if more people with violent injuries had responded at follow-up.

It is important to note that although violence was a significant predictor of both PTSS and depressive symptoms, other factors appeared to have stronger roles. Having past mental health problems, and identifying with a minority religion, increased the odds more than violence.

There are several possible explanations for the increased risk following violence. It has been suggested that after a violent attack, people feel more helpless as they cannot take preventive precautions, in the way that they might, for example, change driving habits after an accident (Alarcon et al., 2012). Violent injuries are by nature more personal, and there is an interaction with the attacker, even if they were previously not known to the victim. The increased personal involvement in assault has been hypothesised to lead to more emotional responses (Alarcon et al., 2012). Equally, the direction of the relationship could be reversed: violent behaviour in men is known to be associated with psychiatric disorders including anxiety, alcohol and drug dependence, so those with existing mental health disorders may be more likely to find themselves in violent situations (Coid et al., 2013). Interestingly, Coid et al's research showed that men who were either in gangs or who engaged in violent behaviour in non-gang settings, had a significantly lower prevalence of depressive symptoms than non-violent men. The authors hypothesised that depressed individuals were less likely to behave violently, or alternatively that violence may be a mechanism to enhance self-esteem, and thus buffer the effects of depressive symptoms. Such an effect could act could have weakened the associations in the present data, as the group of people injured violently is likely to include violent men and those in gangs.

The effects of violence in this sample have to be considered in the context that violence had a strong propensity to affect deprived groups. Even though the literature had discussed this, the extent of the effect was striking. Violent injuries were significantly more common among people who were of Black or Black British, Asian or British Asian origin; with parents born outside the UK; with no educational qualifications or none higher than GCSE; unemployed or in the lowest income bracket. It was also more likely to affect young men. There was some evidence of increased rates of traumatic events among those injured violently; this was significant on measures of childhood trauma. This was suggestive of a violence- and trauma-laden environment. Experiencing two or more traumatic events was strongly associated with worse psychological outcomes, as was physical abuse in childhood.

There appeared to be two distinct groups among those who were injured violently, based on recruiting them and speaking to them about their experiences. These are offered qualitatively with the caveat that they are based on personal impressions and on notes recorded in the vignettes. However, they offer details and complexity that could not be captured quantitatively.

One distinct group comprised young men who had been injured through suspected gang violence. Many, though not all, were of ethnic minority origin. All claimed to be innocent. The nature of the injuries suggested they were inflicted by a gang. For example, they may have described a gang, or a

group of attackers. There was often no obvious reason, such as a mugging, for the attack; or at least none they wished to share with the researcher. These are estimated to have made up between a third and half of the sample of violently injured participants. Gang violence is discussed in more detail below, in section 7.3.1.

A second typical group was older men who had problems with alcohol misuse, who may have been homeless or living in sheltered accommodation, and who had a history of social or psychological problems. Their injuries were often received while they were under the influence of alcohol, whether the mechanism was accidental or violent.

In addition, an aspect of violent injury deserves mention because it was rare. Four women in the sample were either known or believed to have been injured in domestic or intimate partner violence. In a sample of all women attending general practice, 39% had experienced violent behaviour from a partner, suggesting such injuries are relatively common (Bradley, Smith, Long, & O'Dowd, 2002). It is not clear why there were so few cases in this sample, and incidence is likely to have been underreported (T. Weaver, personal communication). Women may have presented their injury as accidental when in fact it was received violently, or may have presented violent injuries inflicted by partners or family members as being perpetrated by strangers (e.g. muggings, or being a bystander in a fight). More specific, sensitive questions may be required to elicit this sensitive information. Equally, such injuries may tend to be less physically severe in terms of requiring treatment by major trauma or OMFS.

7.3.1 Gang violence

Gang violence was certainly a factor in a large number of injuries, and it is regrettable that this was not formally quantified. In the absence of a quantifiable measure, several facts support the belief that gang violence was common in the sample. East London has a much higher incidence of gang membership than England as a whole, as discussed in the literature review (Coid et al., 2013). As well as perpetrating violence, gang members have significantly increased odds of being victims of violence. Coid et al noted that gang members were more likely to be male, young, unemployed, and of Black ethnicity or from the Indian subcontinent, as compared with non-violent men. It is interesting how closely this intersects with the high risk groups in the present study, both in terms of risk of violent injury and of subsequent distress.

Trauma care may be one of the key contact points between gang members and the systems which may be able to intervene, and it has been suggested that in areas where gang activity is common, all individuals being treated by health services should be asked about gang membership (Coid et al.,

2013). Gang members have elevated levels of psychological morbidity, and are more likely to fear future victimisation, indicating they have multiple risk factors for distress.

In multidisciplinary meetings discussing patients with gang-related injuries, there was occasionally a suggestion that individual members of the team believed that 'these kids had it coming'. In 1991, research showed that emergency department doctors believed patients injured through violence were "largely responsible for their own injuries" (as cited in McBrearty, 2011, p. 24). There was some evidence of this during fieldwork for the present study, although it was certainly not true of all staff, and indeed some took a particular interest in these cases. However, it is worth highlighting to trauma staff that those injured violently have a particularly high risk of PTSS and other psychosocial problems.

A considerable problem is that these groups are particularly hard to engage with. Young men involved in gangs are likely to have poor experiences of school and other systems, like health or social care. Although they could usually be engaged in fieldwork face-to-face in hospital, they rarely responded to follow-up questionnaires. This has ramifications for their hospital treatment – in terms of medical and surgical care, and interaction with staff – and for potential psychological interventions. Organisations like Redthread (www.redthread.org.uk) already offer valuable support of this kind, although not at the Royal London Hospital; they place youth workers in trauma centres to engage with young people involved in gangs. Similarly, in America, an intervention was trialled to engage teenagers admitted to hospital with evidence of alcohol use and violent behaviour; teenagers who received a brief intervention showed improvements in alcohol use and violent behaviour at follow up (Walton et al., 2010). Such initiatives could be highly effective, and could help seize unique 'teachable moments'.

7.4 At-risk groups pose a problem for interventions and for future research

The extent to which risk factors were concentrated in particular groups was one of the most striking findings in this study. The people at the highest risk of distress were those in one or more high-risk categories, including those injured violently, non-white ethnic minorities, with low education or income, or unemployed, and with a history of mental health problems. Not only were these groups at the highest risk of psychological distress, however, they also overlap considerably with the groups that were least likely to follow-up. Therefore, the people that were hardest to follow-up for research were also those in most need of intervention.

For young people involved in suspected gang violence, and older men with alcohol misuse, there were distinct problems with follow-up. Maintaining contact for medical or psychological treatment might be similarly problematic. Whereas most participants could be contacted, even if they chose not to respond at follow-up, among high risk groups – those with possible gang involvement or chronic alcohol misuse – it was often impossible to make contact at all. They were less likely to provide (or be able to provide) postal addresses. Emails, phone calls or texts revealed incorrect addresses and numbers that were not in use.

Interventions to tackle these individuals at high risk of distress may be best administered while individuals are in hospital. This goes against current NHS guidelines, which favour 'watchful waiting' for PTSS, especially if acute symptoms are mild, with a follow-up at one month (National Collaborating Centre for Mental Health, 2005). Because most PTSS remits without intervention, early intervention is not recommended, and can even have damaging effects: instead, individuals and health practitioners should monitor symptoms after a traumatic event. However, it is unclear who would suggest to at-risk trauma patients that they should engage in watchful waiting, or when it would be suggested, especially for those who may be less engaged with follow-up. The present findings suggest that early identification and intervention may be essential in some cases. This concurs with the suggestions of others studying trauma patients (Alarcon et al., 2012; O'Donnell, Bryant, Creamer, & Carty, 2008; Stephens et al., 2010).

Only a small minority of facial trauma outpatients in the pilot study had sought emotional help, despite the high prevalence of psychological distress. The findings suggest some trauma patients lack insight into their own symptoms. However, the majority were willing to consider psychological treatment if it were recommended. O'Donnell et al found that only 33% of study participants who received a psychiatric diagnosis from the researchers had sought mental health treatment independently. It has been reported that traumatic injury survivors have little awareness that professional treatment can tackle PTSS (Wong & Kennedy, 2011). There is a need for medical professionals to identify significant symptoms and to initiate psychological support.

However, at-risk individuals may also feel more at ease with people who are not part of the usual medical staff, especially those suspected of gang involvement, and older men with alcohol misuse. It was not uncommon for patients in these two groups to have been aggressive with staff, and hospital security was often involved. There were occasions when participants revealed important details to the researchers that they had not shared with hospital staff. These included difficulties in their home and personal lives; details that would not affect surgical care, but might affect the way a vulnerable patient interacts with staff. If a vulnerable person is given time to talk with a willing listener, perhaps

one who is not part of the hospital system, there may be a unique opportunity to engage them and instigate changes in lifestyle.

7.5 Deprivation appeared to be key

Although not specifically measured in the study, nor hypothesised as a predictor, deprivation emerged as a key construct in these findings. The population from which I was recruiting came largely from deprived areas, and the variables that predicted poor outcomes were often those associated with deprivation.

Deprivation is complex and there is no universal definition or accepted set of criteria, even within the UK agencies which record it. Broadly, it relates to a lack of resources, whether in terms of finances, education, health, service provision or living conditions; the term 'multiple deprivation' is sometimes used to reflect its multi-faceted nature. Income and employment are the most commonly used indicators in the UK, and both are causally associated with deprivation (McLennan et al., 2011; Payne & Abel, 2012). In the present study, low education, unemployment and low income were interpreted as measures of deprivation. This is substantiated by findings from the SELCoH study which indicated that level of education, income, and employment status were more useful than occupational social class as determinants of mental and physical health (Hatch et al., 2011).

There are several pathways that meant study participants were likely to come from deprived backgrounds. Firstly, the Royal London Hospital, where all recruitment was carried out, is in Tower Hamlets. Not all participants came from the immediate neighbourhood, some having been transferred from other hospitals, but the majority were local. Tower Hamlets, along with nearby Newham and Hackney, which are also served by the hospital, are among the most deprived areas of London, and have the highest level of income deprivation in England (McLennan et al., 2011). Secondly, East London is particularly ethnically diverse, as is London generally, and the sample included a fair representation of ethnic minorities. People of ethnic minority, and specifically of Bangladeshi, Pakistani and Black African ethnicity, are more likely to live in the most deprived areas of Britain, according to recent research on ethnicity, neighbourhood deprivation and quality of life (Gumber & Owen, 2015). Finally, deprivation is often a determinant of violent injuries, as seen in alcohol-related facial injuries (Conway et al., 2010) and youth violence (Herrenkohl et al., 2000).

Not only was deprivation common in the sample, it was also associated with worse psychological outcomes. In the univariate analyses, the strongest risk factors for PTSS and depressive symptoms included low education, ethnic minority status and violent injury; all are known to be associated with deprivation. A factor that was significant in the adjusted models was identification with a minority

religion; this was associated with ethnic minority status, and potentially with deprivation in turn. Variables like education could not be added to the adjusted models, but may still have played a role in predicting poor outcomes. This is substantiated by previous research in inner city London which found higher socio-economic status had a protective effect against common mental disorder, which includes depression and anxiety (Hatch et al., 2011). The relationship between deprivation and poor mental health could operate in both directions; while deprivation is likely to lead to worse health, it is equally possible that mental illness leads to unemployment and socio-economic difficulty. This raises important questions for future research.

Childhood physical neglect may also have captured deprivation, and was associated with all outcomes in univariate analyses. The childhood trauma questionnaire items on physical neglect included "I had to wear dirty clothes" and "I didn't have enough to eat": these could relate to childhood poverty as much as to intentional neglect. The WHO has called for further research to help distinguish parental neglect from poverty-related deprivation (Krug et al., 2002), although it notes that child neglect in general is associated with lower levels of education and income. In this study, no other childhood trauma domains were as strongly associated as physical neglect with the key outcomes.

In summary, people in this study appeared disproportionally likely to experience deprivation, and deprivation was in turn associated with worse outcomes.

7.5.1 There were ethnic and religious differences in psychological outcomes

The differences relating to ethnicity and religion were intriguing, with different patterns emerging in PTSS and depressive symptoms. This study had an advantage over the numerous studies that have resorted to ethnic categories of white and non-white. Regrettably, ethnicity could not be included in the adjusted models, however. Although the small samples of ethnic minority groups limited more detailed analyses, the findings as they stand offer starting points for associations and future research.

In the sample, ethnic minority status was associated with low income and unemployment, and thus the vulnerabilities and risks related to deprivation could play a role. Furthermore, there was not a simple effect of ethnic minority status, or of being non-white. Rather there were different outcomes for people of different ethnicities in the different measures of distress. While being Black or Black British was a risk factor for PTSS, both Black or Black British and Asian or British Asians had an elevated risk of depressive symptoms. Only people who were Asian or British Asian had an increased risk of anxiety symptoms. Similar patterns were observed in the pilot study, where Asian people had a much higher prevalence of depressive symptoms (73%).

Meanwhile in the longitudinal analyses, people identifying with 'other' religions, which were interpreted as minority religions, were at higher risk of symptoms in all three domains of psychological distress. This striking but somewhat problematic finding is believed to have captured an aspect of vulnerability linked to minority status.

There could be an unmeasured effect of migration status in the study. People who have migrated for political or asylum reasons have been reported to have increased odds of PTSS (Frissa et al., 2013). Traumas such as war or persecution, which occurred in the country of origin, increase the risk of subsequent PTSS. In addition, migrants can experience adversity and discrimination in their new location. One third of participants in this study were born outside the UK, but their reasons for immigration were not recorded. We do not know if they had adverse experiences that led to their migration, but it is a possibility. Migration status might therefore be a confounder; associated with the effects of ethnicity or religion, but not measured.

Minority status itself has been hypothesised to be associated with worse outcomes, including PTSS (Stephens et al., 2010). This is partly due to increased risks of violent injury and of other traumatic experiences; this was clearly observed in the patterns of risk for violent injury the present study. In addition, mental illness among people of ethnic minority status can be under-reported and misdiagnosed (Stephens et al., 2010).

There have been contradictory findings on ethnicity and PTSS. The SELCoH study found no associations (Frissa et al., 2013); this contrasted with a UK-wide study which observed that black men had more current PTSS (McManus et al., 2009). The SELCoH study also found complex ethnic differences in depressive symptoms. It seems most likely that ethnicity is one of several risk factors for deprivation, violent injury and psychological distress, which cannot be fully disentangled in the present data. The patterns are likely to be specific to local areas.

In future studies, additional measures to assess factors like acculturation, reasons for migration and experience of discrimination would help in unpicking ethnic differences, although first and foremost, larger samples are required.

7.6 Although appearance concern was not high overall, it remained a problem for certain groups.

One particularly interesting finding about appearance concern was that levels of concern in this clinical sample were comparable to those of the general population, with no increased concern following either facial or other traumatic injury. Populations with visible differences have previously

been found to have higher levels of concern than the general population (Rumsey et al., 2004; Rumsey & Harcourt, 2004).

The timing of measurement and the nature of this sample are relevant. Baseline measures were taken soon after injury, which has implications. Firstly, concerns around survival and recovery may have been more prominent, as evidenced by the high prevalence of psychological distress. Participants might not yet have had time to consider visible changes. Secondly, at baseline people might not have faced any sense of external judgement: they were still in the safe environment of the hospital, rather than interacting with people in their 'normal' life at home, work or leisure. In the words of a facial surgery patient in a qualitative study, "It's a good thing I only have to walk around in here [hospital], not outside. People would stare at me… my face is lopsided." (Konradsen, Kirkevold, & Zoffmann, 2009, p. 2412).

In the longer term, there would have been relatively little objective change in appearance for facial trauma patients in the present study. Standards of surgery are high, and most people would be left with minimal scars or other permanent changes, as judged by the surgeon who rated the research photographs, and in the wider expectations of OMFS surgeons involved in the study. However, this in itself was not expected to make a significant difference, as previous research has shown that the perception of changed appearance has a much stronger role than actual change, and that even minor injuries lead to appearance concern (Lee, 2009). Similarly, there has often been no association between objective severity of disfigurement and level of concern, and this was confirmed in the present study.

The low levels overall should not obscure the fact that there were individuals with very high levels of appearance concern. As in the general population, there was a continuum of appearance concern, and people with significant symptoms of psychological distress were particularly likely to feel appearance concern. Factors such as the preponderance of men brought down the group means, as evidenced by the significantly increased levels of concern among women, which remained after adjustment for other factors.

An important question, and one which cannot be satisfactorily addressed from these data, is the direction of the relationship between appearance concern and distress. They were strongly associated, and some researchers have assumed that symptoms of depression and anxiety are triggered by appearance concern (Nwashindi et al., 2014). The visible reminder of trauma could lead to increased psychological distress. This is illustrated by a qualitative quote in a study on the

experiences of crime victims: “I am scarred for life probably, you know every time I look in the mirror in the morning I see this (scar) on my face…I get upset you know.” (McBrearty, 2011, p. 23).

On the other hand, one is tempted to give precedence to depression, anxiety and PTSD as recognised and established psychiatric conditions. However, there is a risk of ‘silencing’ the issue of disfigurement in clinical settings. A qualitative study of patients undergoing facial surgery for head and neck or eye cancer found that both nurses and patients failed to raise issues of disfigurement in their exchanges, although both discussed concerns privately with researchers (Konradsen et al., 2009). A key theme was that ‘disfigurement is a luxury problem’ for people who have experienced serious, possibly life-threatening cancers – or injuries, in the present study. The vignettes in the present study revealed few mentions of appearance, and it did not emerge in the qualitative analysis of vignettes. This mirrors the pattern that appearance is not an issue open to discussion: either patients see it as a ‘luxury’, or fear that clinicians will view it this way. Konradsen et al flagged the risk of patient and clinician assumptions going unchallenged if disfigurement is not discussed, and warn against tacit conversational rules that skirt the subject.

There was evidence of the pre-existence of both distress and appearance concern. The prevalence of past mental health was high, and a substantial proportion of appearance concerns at baseline related to issues that pre-dated the injury, such as weight and ageing. The level of concern about these issues before injury is not known. It is possible that the pre-existence of either distress or appearance concern increased the risk of the other. Alternatively, both appearance concern and psychological distress may be associated with an unmeasured common factor.

The importance given to appearance may be quantitatively or qualitatively different depending on cultural context. There was a strong univariate association between appearance concern and Asian or Asian British ethnicity in this sample, and the ‘other’ or minority religious group had significantly higher appearance concern in the adjusted model. Interim data from the study were presented at a psycho-trauma conference in Uganda; during the questions, it was proposed that people in developing countries would feel greater shame because of disfigurement, which in turn would lead to greater distress, and even suicide. Although it was not clear what might cause the differences in developing countries, it highlights the potentially powerful differences across cultures.

One wonders if appearance concern is a worthwhile consideration among trauma patients. While a minority of people experienced high appearance concern in the absence of psychological distress, for the majority these were intertwined. Appearance concern should be considered by psychological and psychiatric professionals who treat trauma patients with distress. However, perhaps trauma

staff at the frontline should focus more on identifying psychological distress. This in itself would identify the majority of people affected. Appearance change may already be a prominent concern among OMFS surgeons, but this study shows that it is equally important in major trauma surgery.

7.6.1 Bravado

Other less tangible variations may have played a role in appearance concern, too. Anecdotally, and as recorded in the vignettes, some young male participants commented that the scars would be welcome, and felt they would look impressive. There may be an element of bravado in such statements, and they may reflect a very particular youth culture. No previous reports were found of patients perceiving their changed appearance in this way, and this appears to be a novel finding.

Interestingly, the idea that scars will prove attractive has some scientific basis. An experimental study manipulated photographs of faces by adding minor scars that gave an impression of being post-traumatic (as opposed to being caused by illness, for example). Participants rated these stimuli on attractiveness as a short- or long-term partner. There was a significant effect for women finding scarred men attractive as short-term partners (Burriss, Rowland, & Little, 2009). The findings mirrored previous studies showing that men perceived as being risk-takers were rated as more attractive as short-term partners, cited in the same article. The authors hypothesised that scars may present evidence of heightened masculinity. Attitudes within street gangs have been reported to be hyper-masculine (Home Office, 2013).

There was evidence of bravado in a wider sense in the vignette analysis, beyond bravado about appearance. A teenaged stabbing victim was quoted as saying he was not worried about seeing the gang who attacked him again because “I’m not the type to be scared or freak out. I’m not scared of death.” (Skinner, 2014, p. 21). This kind of bravery was seen as a performative utterance, a way of defending self-esteem. It is doubtful whether such bluster should be taken at face value, as it may conceal deeper psychological distress. In any case, such attitudes should not deter clinical staff from raising concerns about young people’s mental health.

Warburton and Shepherd suggested that “Because facial injuries often lead to disfiguring effects, patients with facial trauma often feel vulnerable and a so-called ‘teachable moment’ exists.” (Warburton & Shepherd, 2002, p. 658). The present findings suggest that the disfiguring effects are of limited concern to certain young men. Injury itself, especially violent injury, may be the source of a teachable moment, not any disfiguring effects.

7.7 Study limitations

Some degree of sample attrition would be expected in this population. However, certain subgroups were particularly difficult to follow up, such as those that had experienced violent injuries, and certain demographic groups. These effects reduced the power of statistical models, and prevented more detailed analyses being carried out. However, the use of multilevel models, and in particular the decision to include the baseline measures of ASDS and HADS, mitigated these negative effects. Previous research reported that the prevalence of PTSD did not decline for victims of violence (Johansen et al., 2008). This finding supports the validity of including baseline measures in the adjusted models, especially for people injured violently. Non-representative samples are a common problem in research on violence (Weaver & Clum, 1995), and this approach reduced the ill effects.

The differences in follow-up for those with significant psychological distress were also a limitation. As a result, follow-up prevalence of distress is likely to be underestimated. However, this provides a yet stronger argument for the need for psychological screening and intervention.

The analyses made a strong assumption that the ASDS and PCL-S measured the same core experience. However, this was justified in the data, as discussed in section 3.3.3.2.

The results may be quite specific to this urban group, especially regarding the effects of violence, but this is also a strength because it provided a unique insight into this often hard-to-reach group. This study has answered a call for local and specific information (Hatch et al., 2012), in the context of the risk of mental health disorders following injury.

The lack of psychiatric interview limited the conclusions that can be drawn, either in relation to current psychological symptoms or past mental health. The simple measure of past mental health proved to be a strong predictor, but did not provide a definitive assessment as an interview would have done. This would greatly strengthen future studies, but has inherent difficulties; interviews require a great deal of time and are thus harder to accomplish in larger studies. Inclusion of an interview would also further reduce participation. Furthermore, it has been suggested that in research on trauma patients, only experienced clinicians should administer structured psychiatric interviews. PTSD and depression have particularly complex courses following trauma and reliving the circumstances of the trauma may precipitate distressing symptoms. Non-clinical interviewers, even if experienced, are at risk of misdiagnosing and overestimating psychiatric disorder (Steel et al., 2011). Of course, this adds to the difficulty and expense of psychiatric assessment. Researchers on the SELCoH study have stated that while the lack of clinical interview may affect estimates of prevalence, it is likely to make little difference in terms of patterns of PTSS (Frissa et al., 2013).

It would have been helpful to have definitive data on gang involvement. One study asked outright "Are you currently a member of a gang?" (Coid et al., 2013, p. 986), which, in retrospect, might have been an option. However, that research was carried out on a general population sample; there would be additional issues around ethics as well as the accuracy and honesty of responses when dealing with people recently involved in violent altercations, and undergoing medical treatment. In some cases, the police were involved and were sometimes present in the trauma centre.

Other psychosocial factors were not collected that might have affected outcomes, such as sense of threat to life, and in the longer term, litigation as a result of injury, but the questionnaires were already extensive and everything could not be included.

The clinical data were limited and included information available on medical notes when patients were admitted, and simple measures recorded on the trauma research database. It was not possible to obtain information on long-term physical outcomes. It would have been useful to have data on wider factors, including physical impairment, use of rehabilitation services or physiotherapy, any need for further surgery, and more robust data on head injuries.

More importantly, the study did not take account of whether people received psychological support. It would have been multi-faceted and difficult to quantify, but a list of likely options, such as was used in the pilot study, could have added insight.

The main hypotheses could be tested, but were limited by lack of power to make some more subtle adjustments to the models, including many of the explanatory variables. This reflects a contradiction within this study and in many others in the field: the need to assess a wide range of measures hampered by the difficulty of recruiting and retaining substantial samples.

7.8 Practical and clinical implications

At the time of conducting this research, there was no routine assessment of patients' emotional needs. The exception was patients who were known to have psychiatric conditions, and who were usually excluded from the research because they had been admitted following deliberate self-harm, or had active psychosis. Among the rest of the patients, psychological needs were occasionally but not routinely discussed in multidisciplinary meetings, and trauma staff recognised acute psychological needs in a small number of patients. These were seldom if ever treated by psychological or psychiatric specialists, but the surgeons, nurses and associated staff paid particular attention to patients deemed to be in distress. However, the present findings suggest that clinically significant distress is far more widespread than is usually recognised by members of the trauma team, who, after all, each need to focus on their own area of expertise.

Furthermore, the patients identified by trauma teams were often those few who had suffered a bereavement related to their injury and hospital admission. Without disputing their needs, this research highlights additional compelling risk factors.

Despite the predominant preference for watchful waiting for PTSS, the present findings suggest more immediate intervention may be required for some groups. This requires measures that can distinguish between transient symptoms and those that will persist. This study suggests a history of mental illness, violent injury, or coming from a deprived or minority background are key risk factors.

After recruitment had finished, the OMFS team introduced a psychologist to their multi-disciplinary team meetings as a result of several studies into distress among OMFS patients, and a growing awareness of psychological needs. The psychologist will be able to identify early symptoms of distress with a view to treatment and intervention, or at the least for communication to GPs and others in primary care. Another development after fieldwork had finished was that a website was launched by the Centre for Trauma Sciences Centre at Barts Health Trust, much of whose work is carried out in the major trauma ward where this study was conducted (www.aftertrauma.org) (Centre for Trauma Sciences, 2014). Aimed at trauma patients and their families, it offers advice on possible outcomes after injury, including brief sections on emotional reactions, stress and PTSD. These pages give advice on self-care and recommend seeking professional help if necessary. The site also provides a forum for patients to speak to each other. The site focuses on physical difficulties, but such a resource may help to flag possible psychological outcomes to patients.

In addition to the psychological comorbidity, traumatic injury is in some cases accompanied by other complicating factors. For example, some people are physically unable to work for a time, and for those employed in casual positions, there is a real risk of becoming unemployed. Some will be unable to resume former occupations, especially if these involve manual labour. Injury may also be accompanied by changes to personal circumstances, such as people who pursue litigation, or young people who move back into their parental home while they recover. Access to advice on rights and benefits will help, alongside psychological support.

There are implications beyond clinical practice too. There is a growing awareness of injury and violence as public health concerns, which these findings strongly support. Violence prevention would be one way to reduce psychological distress, and in London, organisations like Kids Company and The Crib carry out work to engage and support young people at risk of repeated involvement in violence. There have been calls for injury and violence prevention bodies to partner with researchers

and health systems, from organisations including the American National Center for Injury Prevention and Control (Mahendra, Roehler, & Degutis, 2012), and these findings support such calls.

7.9 Conclusion

This study established the prevalence of psychological distress (PTSS, symptoms of depression and anxiety) and appearance concern in a sample of trauma patients hospitalised in East London. It tested the hypotheses that i) interpersonal violence and ii) facial injuries would be associated with higher prevalence of psychological distress and appearance concern. It also tested the hypothesis that iii) explanatory psychosocial variables would be associated with worse psychological outcomes. These were a past history of mental illness, alcohol misuse, poor wellbeing, poor quality of life, lack of social support, childhood trauma, recent traumatic events and coping mechanisms.

These aims were investigated in two studies: a cross-sectional pilot study and a larger prospective study. The prevalence of psychological distress was high, and symptoms were highly comorbid. Interpersonal violence was significantly associated with PTSS, depressive symptoms and appearance concern after adjusting for other factors, but not with symptoms of anxiety. A history of psychological distress was associated with worse outcomes. There were complex demographic risk factors, on measures relating to socio-economic deprivation and ethnic minority status.

The study's unique contributions include, firstly, understanding mental health after injury in a specific and often hard-to-reach urban population. The research supports previous findings of risk factors following injury, including violence, and reproduces these in an area with elevated risks of deprivation and gang violence.

Secondly, it established that there were no significant differences between people with facial and non-facial injuries in terms of psychological outcomes.

Thirdly, it offered insight into appearance concern in trauma patients, which had not been thoroughly studied in the past. Although appearance concern was not high overall, it was a significant problem among people with symptoms of psychological distress. There were shared risk factors between appearance concern and distress, including violent injury and past mental health. There was a tentative finding that head injuries were associated with lower levels of appearance concern.

Finally, it provided detail on the roles of explanatory psychosocial variables in distress in this sample. There was particularly compelling evidence that a past history of mental illness, childhood trauma, negative aspects of social support, and traumatic life events contributed to distress in this sample.

These findings have relevance for medical practice. Firstly, surgeons and associated trauma healthcare professionals can use the findings to be vigilant for distress in their patients. Particular

attention should be paid to people with a history of mental health problems, those from deprived or minority groups, and those injured through violence. The data provide a case for the need to routinely screen for distress in trauma settings. Those injured through violence or with pre-existing social issues are often harder to engage. They may pre-emptively reject support, if it is not offered in an acceptable way. However, hospital admission may provide a unique window of opportunity to administer interventions. Psychologists treating people post-injury should be aware of the high likelihood of comorbid psychological conditions. They should also consider possible appearance concern.

Secondly, these findings provide public health professionals with further evidence of the deleterious impact of injury and violence. The poor mental health outcomes have societal and financial costs, and have ramifications in terms of the future risk of violent behaviour. They also add information to localised problems around deprivation and violence.

Finally, future researchers can build on the exploratory findings relating to deprivation and ethnic differences, as well as learning from the difficulties of recruitment and retention of high-risk groups. As a result of this study, further research might be conducted to explore the experiences of ethnic minorities in greater detail, ideally with larger samples. Attempts to include the many non-English speaking patients would be valuable. The development of interventions could well focus on people from socio-economically deprived backgrounds and those injured through violence.

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9 Appendices

9.1 Published paper on cross-sectional pilot study

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British Journal of Oral and Maxillofacial Surgery 52 (2014) 513–517

BRITISH Journal of Oral and Maxillofacial Surgery

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Quality of life, psychological wellbeing and treatment needs of trauma and head and neck cancer patients

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Accepted 26 March 2014

Available online 29 April 2014

Abstract

There is increasing evidence that patients treated for trauma or cancer of the head and neck may go on to experience psychological distress. We aimed to measure the impact of this on their quality of life (QoL) and to explore their willingness to be referred for psychological support. A total of 96 patients with facial injuries and 124 with cancer of the head and neck completed a self-reported questionnaire to identify psychological distress (Hospital Anxiety and Depression Scale (HADS) and the Acute Stress Disorder (ASD) Scale), quality of life (WHOQoL-BREF), satisfaction with treatment, and willingness to accept psychological support. Thirty-nine percent of patients showed high levels of depressive symptoms and 43% reported high levels of anxiety; 43% in the trauma group and 12% in the cancer group had high ASD scores. Patients with high scores on the HADS reported poorer QoL, and 40% of those with high levels of psychological distress were willing to consider psychological support. Despite the fact that patients report high levels of satisfaction with their medical and surgical care, many have psychological problems and have needs that are not being met. A large proportion would use psychological support services.

Keywords: Psychological; Quality of life; Head and neck cancer; Facial trauma; Depression; Anxiety; Psychological distress

Introduction

Despite considerable advances in surgical restoration, which have resulted in improvements in cosmetic appearance, function, and survival after treatment for injuries and cancer of the head and neck, less attention has been given to patients' overall quality of life (QoL) and their psychological needs after treatment. Studies report a wide range in the proportion of patients who have serious psychological problems.

Rogers et al. found that after 3–4 years, at least one in 10 patients who had had operations for cancer of the head and neck with no recurrence, was anxious or depressed.[1] Similar studies have shown that anxiety levels were highest at diagnosis, while depression was most common during treatment.[2] A cross-sectional study from Taiwan of patients with various stages of head and neck cancer found that 33% had clinically significant levels of depression,[3] and a UK study reported a 22% incidence of anxiety and depression.[4]

In an assessment, UK researchers found that patients with facial injuries had an increased risk of depression (odds ratio (OR) 9.2) and, to a lesser extent, anxiety (OR 2.68), when compared with a control group who were undergoing elective oral and maxillofacial operations.[5] They

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http://dx.doi.org/10.1016/j.bjoms.2014.03.019

0266-4356/

also found that women were more likely to suffer negative psychological consequences. Another study found that 30% experienced depression or anxiety at baseline and one year later, which suggests that these reactions are not transient.[6]

Acute stress disorder (ASD) is a common outcome after traumatic events, including injury or diagnosis with cancer, and comprises distressing symptoms of intrusive reminders and anxiety about the event. High levels of acute stress are reported in patients with facial injuries and they are often accompanied by symptoms of depression.[7]

We know of little research that has included the diverse black and ethnic minority population in the UK. Studies on the coping styles of different ethnic groups of cancer patients in Britain reported that British Asian patients were more likely to disbelieve their diagnosis than those who were white (48% British Asian; 31% white British), and that denial was strongly associated with anxiety and depression.[8] South Asian patients also had a more fatalistic attitude towards their diagnosis than white patients.[8] Clearly, to develop future interventions that aim to improve the well-being of oral and maxillofacial patients, such findings raise questions that require further investigation. Little is known about the willingness of these patients to seek psychological support.

We aimed to examine levels of psychological distress (depression, anxiety, and symptoms of acute stress) in oral and maxillofacial patients based in everyday clinical settings, and to explore their willingness to be referred for psychological support. It is clinically useful to recognise psychological problems, as they can potentially be treated, and interventions can ameliorate dysfunction and improve QoL.

Patients and methods

Sample

Over a 3-month period (January 2012 to March 2012) we invited all patients attending oral and maxillofacial (OMF) outpatient trauma clinics at the Royal London Hospital and outpatient head and neck cancer clinics at St Bartholomew's Hospital, London, to complete questionnaires. This was part of a clinical effectiveness audit registered with the Clinical Effectiveness Unit for Barts Health NHS Trust (approved 8/12/11). Two research psychologists, who were supervised by a consultant oral and maxillofacial surgeon and a consultant psychiatrist, collected the data. Patients aged over 18 years were included, and those who did not speak English, or had psychotic symptoms or impaired cognitive function, were excluded.

Standardised questionnaires

Symptoms of anxiety and depression were measured using the Hospital Anxiety and Depression Scale (HADS),[9] which is the most suitable measure of psychological distress in people who are physically ill. Scores of 8 or above indicate anxiety or depression.[9]

Two QoL questions taken from the World Health Organization Quality of Life Questionnaire (Brief version) (WHOQoL-BREF),[10] which relate to overall quality of life and overall general health, were included. The WHOQoL-BREF is a validated and reliable measure with which to assess quality of life in different medical populations.

The Acute Stress Disorder Scale is a 19-item, self-reported inventory of ASD.[11] Scores range from 19 to 95, and those over 55 indicate psychological distress and post-traumatic stress disorder. It can be used effectively in people who have experienced traumatic civilian events.

Table 1
Patients' details. Data are number (%).

	Outpatient clinic	
	Trauma ($n=96$)	Head and neck cancer ($n=124$)
Sex		
Male	83 (87)	76 (61)
Female	13 (14)	48 (39)
Age (years)		
18-35	57 (59)	16 (13)
36-65	33 (34)	64 (52)
66+	4 (4)	43 (35)
Not given	2 (2)	1 (<1)
Ethnicity		
White	58 (60)	70 (56)
Asian	18 (19)	31 (25)
Black	6 (6)	12 (10)
Other	10 (10)	3 (2)
Not given	4 (4)	8 (6)

Questionnaire on treatment required

This questionnaire included questions devised by the authors to ascertain whether patients had previously sought help for emotional problems, who they had approached, and who they would be willing to see. It also included items designed to find out how satisfied they were with a range of clinical and emotional measures, and to find out in which areas they needed further support.

Statistical analysis

A non-parametric test (Mann–Whitney *U*) was used to evaluate differences in QoL as data from the HADS and ASDS were not normally distributed.

Results

In total, 96 patients with facial injuries and 124 with cancer of the head and neck were included. All the cancer patients participated but 9% ($n=?$) of those injured refused.

Patients' details are shown in Table 1.

Table 2
Number (%) of high scores for anxiety, depression, and acute stress.

	Depression ≥8	Anxiety ≥8	Acute stress ≥56
Trauma	36/85 (42)	34/81(42)	39/91 (43)
Sex			
Male	31/73 (43)	29/69(42)	34/78 (44)
Female	5/12	5/12	5/13
Age (years)			
18–35	24/53 (45)	21/52(40)	25/55 (46)
36–65	9/27 (33)	10/25(40)	12/30 (40)
66+	2/3	2/4	1/4
Ethnicity			
White	16/51 (31)	16/48(33)	23/56 (41)
Asian	11/15	8/15	6/16
Black	2/6	4/5	3/6
Other	6/9	5/9	5/9
Not given	1/4	1/4	2/4
Cancer	37/101 (37)	46/104 (44)	10/84 (12)
Sex			
Male	23/61 (38)	27/64 (42)	6/73 (8)
Female	14/40 (35)	19/40 (48)	4/12
Age (years)			
18–35	5/14	5/14 (36)	0/9
36–65	22/52 (42)	28/53 (53)	9/48 (19)
66+	10/35 (29)	13/37 (35)	1/27 (4)
Ethnicity			
White	17/58 (29)	28/61 (46)	5/54 (9)
Asian	15/28 (54)	14/28 (50)	1/17
Black	3/7	3/7	2/14
Other	0/3	0/3	0/2
Not given	2/5	1/5	2/7
Overall	73/186 (39)	80/185 (43)	49/175 (28)

High scores classified as depression: ≥8, anxiety: ≥8 on HADS, acute stress ≥56 on ASDS, are indicative of clinically relevant symptoms.

Prevalence of psychological distress in oral and maxillofacial patients

Of all OMFS patients, 39% ($n=73$) showed high levels of depression, 43% ($n=80$) had high levels of anxiety, and 28% ($n=49$) had high levels of acute stress (Table 2). The mean scores of patients who reported high levels of depression and anxiety (scores above 8), which indicate clinically relevant symptoms, were between 11 and 12. These scores are higher than those of the general population.[12] The mean scores for acute stress were particularly high in the trauma group (50.6 compared with 35.8 in the cancer group). There were no significant differences by age or sex.

Quality of life and psychological distress (depression, anxiety, and acute stress)

The median (SD) score of overall QoL for these patients was 3 (1-5).

Results show that QoL had an inverse correlation with scores for depression, anxiety, and acute stress in both groups. These differences were significant for depression (trauma group: $z=-5.64$, $p<.05$; cancer group: $z=-3.39$, $p<.05$), anxiety (trauma group: $z=-3.82$, $p<.05$, cancer group: $z=-3.02$, $p<.05$), and acute stress (trauma group: $z=-3.82$, $p<.05$, cancer group $z=-3.02$, $p<.05$). This shows that patients with high levels of psychological distress are more likely to have a poorer QoL than those with low levels of psychological distress (Table 3).

Table 3
Mean and sum rank scores of overall quality of life (QoL) and levels of psychological distress.

Score	No. of patients	Mean rank of QoL score	Sum of ranks
Depression			
Trauma			
High	36	25.3	885.0
Low	48	54.2	2601.0
Cancer			
High	37	38.8	1434.0
Low	64	58.1	3717.0
Anxiety			
Trauma			
High	34	28.9	952.0
Low	46	48.0	2208.0
Cancer			
High	46	43.0	1978.5
Low	58	60.0	3481.5
Acute stress			
Trauma			
High	39	34.6	1350.0
Low	50	53.1	2655.0
Cancer			
High	10	24.0	240.0
Low	74	45.0	3330.0

WHOQoL-BREF: "How would you rate your overall quality of life?" 1 = poor, 2 = very poor, 3 = neither poor nor good, 4 = good, and 5 = very good.

Treatment needed

In total 29% ($n=61$) of patients reported that they had approached someone about their emotional needs since they began their treatment (trauma group 24%, cancer group 33%). Most had approached a friend or member of the family (33%) or their general practitioner (25%). Overall, 70% (trauma group $n=64$; cancer group $n=77$) in both groups were willing to see someone about their emotional needs if it was recommended by their treatment team. Patients were largely satisfied with the treatment they had been given (Figs. 1 and 2), but 29% overall ($n=47$) thought that their psychological needs had not been addressed. Among those with high levels of psychological distress (depression, anxiety, or acute stress), 38% ($n=36$) thought that their needs had not been met. Patients were asked about the areas in which they needed further support and 24% stated they needed help to cope with their condition emotionally ($n=20$ in the trauma group, $n=24$ in the cancer group). Among those with high levels of distress, 35% ($n=17$) in the trauma group and 40% ($n=21$) in the cancer group wanted more support in this area. In both groups, 17% of patients (trauma group $n=13$; cancer group $n=15$) felt that they needed more support to cope physically with their condition, and 20% in the trauma group

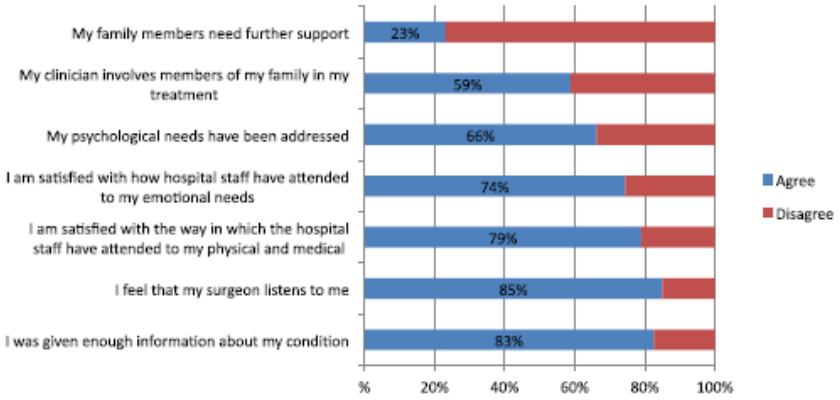

Fig. 1. Trauma group: satisfaction with treatment (blue = agree, red = disagree).

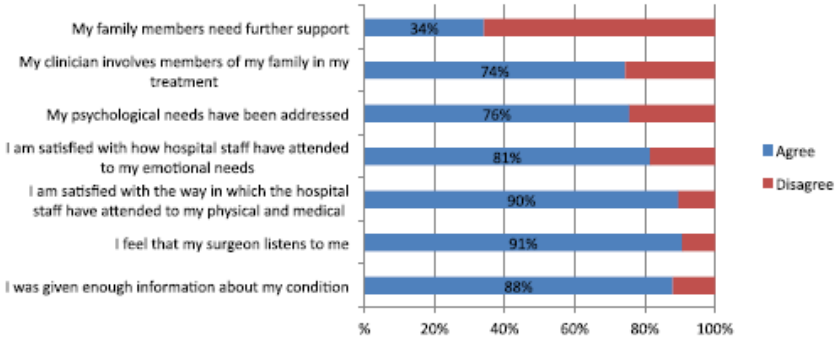

Fig. 2. Cancer group: satisfaction with treatment (blue = agree, red = disagree).

($n = 19$) and 18% in the cancer group ($n = 20$) felt the need for further financial support.

Discussion

Prevalence of psychological distress in oral and maxillofacial patients with injuries and with cancer

There were high levels of psychological distress in a cross-section of all the patients. The highest levels of depression were seen in South Asian participants (11/15 with trauma, and 15/28 with cancer). A poorer QoL was significantly associated with higher levels of psychological distress (HADS, ASDS).

Although satisfaction with surgical and medical treatment was high, the psychological needs of patients were not always addressed. A high proportion stated that they were willing to have psychological treatment although few had actively sought it. Many, including those who were most distressed, reported that they had turned to members of the family for support during treatment, which indicates a potential burden for patients' families. The psychological impact on families may be considerable and future studies that examine this would be beneficial.

Our findings in South Asian patients are consistent with other reports in which Asian patients with cancer reported higher levels of depression on the HADS questionnaire than a white group.[8] However, to our knowledge, the present study is the first to measure the prevalence of psychological distress in South Asians with cancer of the head and neck, and further research on a larger sample is required.

The strength of this study is the inclusion of a diverse ethnic population, but because of language barriers we could include only a relatively small sample of ethnic minority patients (those who could read and write English). Our measures were simple to use in a clinical setting. Future research using standardised psychiatric interviews to verify results on the HADS and ASDS would make findings more robust.

The study was limited as it did not include details of the site of the cancer or injury, the treatment given, and the time since diagnosis or injury. The mechanism of injury, such as interpersonal violence or accident, was not taken into account and may influence outcomes. However, our aim was to explore levels of psychological distress and to establish which needs are not being addressed in OMFS patients. Future studies are needed to investigate predictors of outcome.

Coexisting illnesses such as depression and anxiety may complicate recovery and lead to poor adherence to treatment and a poorer QoL. However, there is a growing recognition amongst clinicians that patients require psychological support, and our findings highlight the need to identify those most at risk through appropriate screening so that early intervention can improve outcome. Obviously there are implications for services, as there is a substantial need for psychological screening and counselling. Before this can be done, more studies are needed to identify the risk factors for and the underlying causes of psychological distress.

Conflict of interest

None.

Ethical approval

This was carried out as part of a clinical effectiveness audit registered with the Clinical Effectiveness unit for Barts Health NHS Trust (approved 8/12/11).

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9.2 Retention of participants at follow up: detailed comparison showing each wave.

This appendix provides a more detailed breakdown of the information provided in section 4.1.2. Here, the differences in follow up are presented separately for each wave.

In Table 63 and Table 64, clinical differences in follow-up at three months and then six months are presented.

Table 63: Three months - clinical and physical differences in follow up. *p<.05 **p<.01 ***p<.001

Variable (baseline n)	Values (baseline n)	% ASD	OR	[95% CI]
Mechanism of injury (225)	Accidental (147)	51.02	1	
	Violent (78)	32.05	0.45**	[0.25,0.80]
Injury site (225)	No facial injury (101)	45.54	1	
	Facial injury (124)	43.55	0.92	[0.54,1.56]
Polytrauma (176)	No (118)	38.14	1	
	Yes (58)	51.72	1.74	[0.92,3.28]
Head injury (225)	No known HI (156)	42.95	1	
	Head injury (69)	47.83	1.22	[0.69,2.15]

Table 64: Six months - clinical and physical differences in follow up. *p<.05 **p<.01 ***p<.001

Variable (baseline n)	Values (baseline n)	% ASD	OR	[95% CI]
Mechanism of injury (225)	Accidental (147)	60.54	1	
	Violent (78)	29.49	0.27***	[0.15,0.49]
Injury site (225)	No facial injury (101)	51.49	1	
	Facial injury (124)	48.39	0.88	[0.52,1.49]
Polytrauma (176)	No (118)	51.69	1	
	Yes (58)	53.45	1.07	[0.57,2.01]
Head injury (225)	No known HI (156)	48.08	1	
	Head injury (69)	53.62	1.25	[0.71,2.20]

At both waves, people injured violently were significantly less likely to follow up. This effect was stronger at six months.

The following two tables show demographic differences in follow-up, first at three months (Table 65) and then six months (Table 66).

Table 65: Three months - demographic differences in follow up. *p<.05 **p<.01 ***p<.001

Variable (baseline n)	Values (baseline n)	% Response	OR	[95% CI]
Gender (225)	Male (171)	42.69	1	
	Female (54)	50.00	1.34	[0.73,2.48]
Age (225)	18-25 (60)	28.33	1	
	26-35 (59)	37.29	1.5	[0.70,3.25]
	36-45 (43)	55.81	3.20**	[1.40,7.28]
	46-65 (45)	60.00	3.79**	[1.67,8.61]
	66+ (18)	55.56	3.16*	[1.07,9.37]
Ethnicity (225)	White, White British (166)	48.80	1	
	Black, Black British (26)	34.62	0.56	[0.23,1.32]
	Asian, Asian British (17)	23.53	0.32	[0.10,1.03]
	Mixed, Multiple, Other (16)	37.50	0.63	[0.22,1.81]
Religion (218)	No religion (80)	55.00	1	
	Christian (106)	41.51	0.58	[0.32,1.04]
	Other (32)	21.88	0.23**	[0.09,0.59]
First language (225)	English (173)	42.77	1	
	Other (52)	50.00	1.34	[0.72,2.49]
Birthplace (224)	UK (143)	43.36	1	
	Outside UK (81)	46.91	1.15	[0.67,2.00]
Parents' birthplace (221)	UK (108)	50.00	1	
	Outside UK (113)	39.82	0.66	[0.39,1.13]
Marital status (223)	Single (112)	39.29	1	
	Married or co-habiting (88)	52.27	1.69	[0.96,2.98]
	No longer married (23)	43.48	1.19	[0.48,2.95]
Highest level of education (198)	GCSEs or none (74)	28.38	1	
	A level and above (124)	56.45	3.27***	[1.76,6.07]
Employment status (208)	Employed (138)	51.45	1	
	Student, homemaker (19)	31.58	0.44	[0.16,1.21]
	Unemployed (26)	26.92	0.35*	[0.14,0.88]
	Retired, sick (25)	52.00	1.02	[0.44,2.40]
Income (136)	Below minimum wage (42)	35.71	1	
	Below UK average (58)	56.90	2.38*	[1.05,5.38]
	Above UK average (36)	55.56	2.25	[0.90,5.60]

Table 66: Six months - demographic differences in follow up. *p<.05 **p<.01 ***p<.001

Variable (baseline n)	Values (baseline n)	% Response	OR	[95% CI]
Gender (225)	Male (171)	47.37	1	
	Female (54)	57.41	1.5	[0.81,2.78]
Age (225)	18-25 (60)	33.33	1	
	26-35 (59)	50.85	2.07	[0.99,4.34]
	36-45 (43)	51.16	2.1	[0.94,4.68]
	46-65 (45)	60.00	3.00**	[1.34,6.69]
	66+ (18)	72.22	5.20**	[1.63,16.63]
Ethnicity (225)	White, White British (166)	56.02	1	
	Black, Black British (26)	30.77	0.35*	[0.14,0.85]
	Asian, Asian British (17)	29.41	0.33*	[0.11,0.97]
	Mixed, Multiple, Other (16)	37.50	0.47	[0.16,1.36]
Religion (218)	No religion (80)	56.25	1	
	Christian (106)	50.00	0.78	[0.43,1.39]
	Other (32)	34.38	0.41*	[0.17,0.96]
First language (225)	English (173)	52.02	1	
	Other (52)	42.31	0.68	[0.36,1.26]
Birthplace (224)	UK (143)	53.15	1	
	Outside UK (81)	44.44	0.71	[0.41,1.22]
Parents' birthplace (221)	UK (108)	59.26	1	
	Outside UK (113)	41.59	0.49**	[0.29,0.84]
Marital status (223)	Single (112)	42.86	1	
	Married or co-habiting (88)	59.09	1.93*	[1.09,3.39]
	No longer married (23)	52.17	1.45	[0.59,3.58]
Highest level of education (198)	GCSEs or none (74)	39.19	1	
	A level and above (124)	59.68	2.30**	[1.27,4.14]
Employment status (208)	Employed (138)	57.97	1	
	Student, homemaker (19)	31.58	0.33*	[0.12,0.93]
	Unemployed (26)	19.23	0.17***	[0.06,0.48]
	Retired, sick (25)	68.00	1.54	[0.62,3.81]
Income (136)	Below minimum wage (42)	30.95	1	
	Below UK average (58)	58.62	3.16**	[1.37,7.30]
	Above UK average (36)	77.78	7.81***	[2.81,21.70]

At both waves, people were significantly less likely to respond if they were young, identified with the 'other' religion group, had low levels of education, were unemployed, or had a low income. In addition, at six months, people who were Black or Black British and Asian or British Asian were less likely to respond.

Finally, differences in follow-up rate by the four outcomes are shown, with three-month responses in Table 67 and six-month responses in Table 68.

Table 67: Three months - psychological differences in follow up. *p<.05 **p<.01 ***p<.001

Symptoms of (baseline n)	Values (baseline n)	% Response	OR	[95% CI]
Acute stress (221)	Low (159)	48.43	1	
	High (62)	33.87	0.55	[0.30,1.00]
Depression (222)	Low (148)	50.68	1	
	High (74)	31.08	0.44**	[0.24,0.79]
Anxiety (224)	Low (129)	49.61	1	
	High (95)	37.89	0.62	[0.36,1.06]
Appearance concern (196)	Lowest tertile (71)	52.11	1	
	Mid tertile (63)	52.38	1.01	[0.51,1.99]
	Upper tertile (62)	45.16	0.76	[0.38,1.50]

Table 68: Three months - psychological differences in follow up. *p<.05 **p<.01 ***p<.001

Symptoms of (baseline n)	Values (baseline n)	% Response	OR	[95% CI]
Acute stress (221)	Low (159)	56.60	1	
	High (62)	33.87	0.39**	[0.21,0.72]
Depression (222)	Low (148)	57.43	1	
	High (74)	33.78	0.38**	[0.21,0.68]
Anxiety (224)	Low (129)	58.14	1	
	High (95)	38.95	0.46**	[0.27,0.79]
Appearance concern (196)	Lowest tertile (71)	59.15	1	
	Mid tertile (63)	60.32	1.05	[0.53,2.10]
	Upper tertile (62)	43.55	0.53	[0.27,1.06]

At three-month follow-up, people who had baseline symptoms of depression were significantly less likely to respond. At six months, responses were significantly less likely from people who had high baseline symptoms of acute stress, depression or anxiety.

9.3 Comparison of PTSS measures

Several measures that assess PTSS were considered for use in the study. The main alternative to the two chosen was the Impact of Events Scale (IES-R) (Horowitz, Wilner, & Alvarez, 1979), which is sometimes used to measure acute stress reactions as well as long term PTSS, and is reasonably common in the literature. Table 70 compares items on the ASDS, PCL-S and IES-R, in relation to the DSM symptoms of PTSD.

Table 69: Item by item comparison of symptoms in DSM-IV and in questionnaires

DSM-IV criteria (for PTSD)		ASDS items		PCL-S items		IES-R items	
Criterion B: intrusive recollection							
1	Recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions	6	Have memories of the trauma kept entering your mind?	1	Repeated, disturbing memories, thoughts, or images of the stressful experience?	1	Any reminder brought back feelings about it.
						6	I thought about it when I didn't mean to.
						9	Pictures about it popped into my mind.
2	Recurrent distressing dreams of the event.	7	Have you had bad dreams or nightmares about the trauma?	2	Repeated, disturbing dreams of the stressful experience?	20	I had dreams about it.
3	Acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur upon awakening or when intoxicated).	8	Have you felt as if the trauma was about to happen again?	3	Suddenly acting or feeling as if the stressful experience were happening again (as if you were reliving it)?	14	I found myself acting or feeling like I was back at that time.

4	Intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.	9	Do you feel very upset when you are reminded of the trauma?	4	Feeling very upset when something reminded you of the stressful experience?	3	Other things kept making me think about it.
5	Physiologic reactivity upon exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event	19	When you are reminded of the trauma, do you sweat or tremble or does your heart beat fast?	5	Having physical reactions (e.g., heart pounding, trouble breathing, sweating) when something reminded you of the stressful experience?	19	Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart.
						16	I had waves of strong feelings about it.
Criterion C: avoidant/numbing							
1	Efforts to avoid thoughts, feelings, or conversations associated with the trauma	10	Have you tried not to think about the trauma?	6	Avoiding thinking about or talking about the stressful experience or avoiding having feelings related to it?	11	I tried not to think about it.
		11	Have you tried not to talk about the trauma?			22	I tried not to talk about it.
		13	Have you tried not to feel upset or distressed about the trauma?			5	I avoided letting myself get upset when I thought about it or was reminded of it.
2	Efforts to avoid activities, places, or people that arouse recollections of the trauma	12	Have you tried to avoid situations or people that remind you of the trauma?	7	Avoiding activities or situations because they reminded you of the stressful experience?	8	I stayed away from reminders of it.
3	Inability to recall an important aspect of the	5	Have you been unable to recall important aspects of	8	Trouble remembering important parts of the		

	trauma		the trauma?		stressful experience?		
4	Markedly diminished interest or participation in significant activities			9	Loss of interest in activities that you used to enjoy?		
5	Feeling of detachment or estrangement from others	3	During or after the trauma, did things around you ever feel unreal or dreamlike?	10	Feeling distant or cut-off from other people?	7	I felt as if it hadn't happened or wasn't real.
6	Restricted range of affect (e.g., unable to have loving feelings)	1	During or after the trauma, did you ever feel numb or distant from your emotions?	11	Feeling emotionally numb or being unable to have loving feelings for those close to you?	13	My feelings about it were kind of numb.
7	Sense of foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal life span)			12	Feeling as if your future will somehow be cut short?		
		2	During or after the trauma, did you ever feel in a daze?				
		4	During or after the trauma, did you ever feel distant from your normal self or like you were watching it happen from outside?				
						12	I was aware that I still had a lot of feelings about it, but I didn't deal with them.

						17	I tried to remove it from my memory.
Criterion D: hyper-arousal							
1	Difficulty falling or staying asleep	14	Have you had trouble sleeping since the trauma?	13	Trouble falling or staying asleep?	2	I had trouble staying asleep.
						15	I had trouble falling asleep.
2	Irritability or outbursts of anger	15	Have you felt more irritable since the trauma?	14	Feeling irritable or having angry outbursts?	4	I felt irritable and angry.
3	Difficulty concentrating	16	Have you had difficulty concentrating since the trauma?	15	Having difficulty concentrating?	18	I had trouble concentrating.
4	Hyper-vigilance	17	Have you become more alert to danger since the trauma?	16	Being "super-alert" or watchful or on guard?	21	I felt watchful and on-guard.
5	Exaggerated startle response	18	Have you become jumpy since the trauma?	17	Feeling jumpy or easily startled	10	I was jumpy and easily startled.

The IES-R includes fewer symptoms, and is less directly comparable with DSM criteria. It was therefore less accurate as a measure of ASD, and also less comparable with detailed PTSD measures at follow-up such as the PCL-S. For these reasons, the ASDS and PCL-S were chosen.

9.4 Data preparation: detailed procedures

Secure data storage

All paper consent forms, questionnaires and other documents were stored in locked filing cabinets in a locked office. Electronic data were anonymised; participants were identified by a unique ID. This included digital photographs of consenting participants. The file that linked unique IDs with participants' names was stored separately, on a secure server, and was encrypted and password protected.

Double data entry

Anonymised data were manually entered into IBM SPSS. Label values were applied to all fields, so that a value entered outside the specified range (e.g. if 44 was entered instead of 4) it was instantly visible. This minimised errors during data entry. Text answers were typed in verbatim.

Double data entry was carried out. I carried out approximately half of the data entry. Ms Kopseschny, the MSc student involved in recruitment, entered baseline data for the 24 participants she recruited. The remaining data entry was carried out by four QMUL undergraduate students recruited through a university internship scheme. Each questionnaire was entered by two different individuals, to minimise systematic errors.

I compared the two complete files using formulas and conditions in Microsoft Excel, and any discrepancies were corrected with reference to the original paper questionnaire. This produced a final clean file that was loaded into Stata for analysis.

Data cleaning

Extensive basic checks were applied to the data. These included:

- Checking the overall number of participants and questionnaires in the data set was as expected;
- Correct assignment to groups, e.g. violent or accidental injury, site of injury;
- Reading open text responses and re-coding if appropriate;
- Reviewing dates, for example age vs. year of birth.

These procedures ensured that all data were securely stored in accordance with ethical guidelines, and that the final data set was accurate.

9.4.1 Handling single missing data items

Single missing items were handled according to instruction manuals. The same principle is recommended for the HADS, WHOQOL, WEMWBS and CTQ. Thus, if an item was missing on a domain, the score was calculated as a mean of the other items in the domain. If the number of missing items exceeded the stated threshold for that domain, the partial data for the participant were not used. Instruction manuals for the ASDS, PCL-S, DAS24 and CPQ do not discuss missing items, so published articles using the measures were examined to see how missing items had been treated. Many papers did not mention missing data, and those that did (Boyes, Cluver, & Gardner, 2012; Edmondson, Mills, & Park, 2010; Hansen, Armour, & Elklit, 2012) typically used complex methods such as multiple imputation, stochastic regression imputation and maximum likelihood estimation procedures. Following discussion with a statistician specialising in such methods (M. Smuk, personal communication), we agreed that the simpler approach discussed above should be applied to all measures. Domains that included four items were calculated if one item was missing. Domains with five or six items were calculated if two items were missing. If more items were missing, the whole subscale was discarded for that participant. The DAS24 total score was calculated if up to four of the 24 items were missing. For the CPQ, missing items were calculated with different thresholds for the confiding/emotional domain (calculated if five of seven items were complete), practical domain (two of three items present) and negative domain (three of four items present). Table 70 shows the percentage of participants whose responses were calculated in this way, and the number that remained missing.

Table 70: Percentage of participants' records calculated to replace missing single items, and percentage where there were insufficient data to calculate the score.

		Baseline		Three months		Six months	
Questionnaire	**Domains**	**Calculated**	**Insufficient**	**Calculated**	**Insufficient**	**Calculated**	**Insufficient**
Acute stress (ASDS)	Re-experiencing	1%	0%	-	-	-	-
	Arousal	4%	0%	-	-	-	-
	Avoidance	0%	1%	-	-	-	-
	Dissociation	6%	0%	-	-	-	-
PTSS (PCL-S)	Domain B: re-experiencing	-	-	0%	1%	1%	0%
	Domain C: avoidant/numbing	-	-	1%	0%	4%	1%
	Domain D: hyperarousal	-	-	0%	0%	0%	0%
HADS	Anxiety	2%	0%	2%	0%	1%	0%
	Depression	2%	1%	1%	0%	2%	0%
Appearance (DAS24)		12%	6%	5%	2%	9%	1%
Quality of Life (WHOQOL)	Physical domain	5%	1%	3%	0%	4%	1%
	Psychological domain	1%	1%	2%	0%	1%	2%
	Social domain	4%	0%	4%	1%	3%	1%
	Environmental domain	4%	2%	2%	0%	0%	0%
	Spiritual domain	0%	0%	-	-	-	-
Wellbeing (WEMWBS)		5%	1%	2%	0%	3%	0%
Social support (CPQ)	Confiding/emotional support	3%	1%	-	-	-	-
	Practical support	3%	0%	-	-	-	-
	Negative aspects of support	1%	0%	-	-	-	-
Childhood trauma (CTQ)	Minimising scale	-	-	1%	0%	-	-
	Physical abuse	-	-	2%	0%	-	-
	Emotional abuse	-	-	1%	0%	-	-
	Emotional neglect	-	-	100%	0%	-	-
	Physical neglect	-	-	1%	0%	-	-
	Sexual abuse	-	-	0%	0%	-	-

The incidence of missing items was substantially reduced, especially at baseline, by checking each questionnaire when it was returned: if an item was missed, I asked the participant to fill it in, if they were willing to do so. Therefore missing items on the key psychological outcome measures (ASDS, HADS, PCL-S) were generally very low, as shown in Table 70.

With two exceptions, missing items appeared to be missing completely at random, with no apparent patterns. The first exception to this was the DAS24, which had a relatively high proportion of missing items at each wave. This is believed to be because some participants felt the appearance questions to be irrelevant to them, despite the fact the measure includes 'not applicable' options.

The second exception is the CTQ, where regrettably one whole question was not included in the questionnaires, and was therefore missing for all 116 respondents. The item was 'People in my family felt close to each other', and forms part of the emotional neglect subscale. Responses were calculated, as above, using the mean from the five remaining items for emotional neglect. This calculated question was included in the total emotional neglect score and the total CTQ score; due caution was exercised in interpreting these scores.

Missing items were not calculated for the PMH, LTE, AUDIT or Brief COPE. Items on the PMH, LTE and AUDIT were deemed too specific to impute: however, total scores were still calculated from items that had been answered, with missing items contributing zero. This introduced a risk of under-estimating events, but this was deemed preferable to an over-estimation. Missing items were not calculated for the Brief COPE as each domain contains only two items. Domains were excluded if not fully answered.

9.5 Using acute stress (ASDS) and follow up PTSS (PCL-S) as repeated measures.

The role of ASD symptom clusters in PTSS

As discussed in the literature review, dissociative symptoms are given particular prominence in ASD, as PTSS is more common in people who experience such symptoms. Researchers have suggested that focussing on particular acute stress symptom clusters may improve predictive power (Brewin et al., 1999). I wanted to test for evidence of this. The correlations between the ASDS symptom clusters of dissociation, re-experiencing, avoidance and arousal and PTSS outcomes are presented in Table 71.

Table 71: Correlations of Acute Stress Disorder Scale (ASDS) and its symptom clusters with PTSS (PCL-S) at three and six months. *p<.05 **p<.01 ***p<.001

	ASDS: total	PCL-S: PTSD total (Three months)	PCL-S: PTSD total (Six months)
ASDS: Total	1.00	0.60***	0.57***
ASDS: Dissociation	0.75***	0.45***	0.40***
ASDS: Re-experiencing	0.85***	0.51***	0.55***
ASDS: Avoidance	0.79***	0.46***	0.33***
ASDS: Arousal	0.90***	0.44***	0.53***

All ASDS clusters were strongly associated with PTSS, at both waves. Re-experiencing, rather than dissociation, had the strongest association of all the clusters. However, the overall ASDS score was most closely correlated with PTSS, and was therefore the best measure to use.

9.6 Additional tables from Chapter 4 results

A number of tables in Chapter 4 showed minimal or no significant differences between facial and non-facial injury participants. As descriptive data had already been presented for the measures, these tables are included for reference here.

Demographic characteristics

Table 72 presents demographics at baseline stratified by injury.

Table 72: Demographics at baseline stratified by injury site. *p<.05 **p<.01 ***p<.001

Variable (baseline n)	Values (baseline n)	% No facial	% Facial	OR	[95% CI]
Gender (225)	Male (171)	47.95	52.05	1	
	Female (54)	35.19	64.81	1.70	[0.90,3.20]
Age (225)	18-25 (60)	51.67	48.33	1	
	26-35 (59)	33.90	66.10	2.08	[0.99,4.37]
	36-45 (43)	32.56	67.44	2.21	[0.98,5.00]
	46-65 (45)	53.33	46.67	0.94	[0.43,2.03]
	66+ (18)	66.67	33.33	0.53	[0.18,1.61]
Ethnicity (225)	White, White British (166)	44.58	55.42	1	
	Black, Black British (26)	46.15	53.85	0.94	[0.41,2.15]
	Asian, Asian British (17)	35.29	64.71	1.47	[0.52,4.18]
	Mixed, Multiple, Other (16)	56.25	43.75	0.63	[0.22,1.76]
Religion (218)	No religion (80)	43.75	56.25	1	
	Christian (106)	39.62	60.38	1.19	[0.66,2.14]
	Other (32)	56.25	43.75	0.60	[0.26,1.38]
First language (225)	English (173)	46.24	53.76	1	
	Other (52)	40.38	59.62	1.27	[0.68,2.38]
Birthplace (224)	UK (143)	48.95	51.05	1	
	Outside UK (81)	37.04	62.96	1.63	[0.93,2.85]
Parents' birthplace (221)	UK (108)	49.07	50.93	1	
	Outside UK (113)	41.59	58.41	1.35	[0.80,2.30]
Marital status (223)	Single (112)	47.32	52.68	1	
	Married or co-habiting (88)	39.77	60.23	1.36	[0.77,2.39]
	No longer married (23)	52.17	47.83	0.82	[0.34,2.02]
Highest level of education (198)	GCSEs or none (74)	47.30	52.70	1	
	A level and above (124)	39.52	60.48	1.37	[0.77,2.46]
Employment status (208)	Employed (138)	44.93	55.07	1	
	Student, homemaker (19)	42.11	57.89	1.12	[0.43,2.96]
	Unemployed (26)	19.23	80.77	3.43*	[1.22,9.61]
	Retired, sick (25)	60.00	40.00	0.54	[0.23,1.30]
Income (136)	Below minimum wage (42)	42.86	57.14	1	
	Below UK average (58)	44.83	55.17	0.92	[0.41,2.06]
	Above UK average (36)	27.78	72.22	1.95	[0.75,5.05]

Unemployed participants were more likely to have a facial injury; there were no other statistically significant differences.

Psychosocial characteristics

Quality of life scores are stratified by injury site in Table 73.

Table 73: Mean scores on quality of life (WHOQOL), stratified by site of injury. (N in brackets)

	No facial injury (84)		**Facial injury (115)**	
	Mean	(SD)	Mean	(SD)
Physical	51.42	(16.26)	53.35	(17.23)
Psychological	58.96	(15.77)	58.23	(13.77)
Social	71.25	(20.61)	74.03	(19.95)
Environmental	66.35	(18.45)	66.70	(21.08)
Spiritual	66.35	(18.45)	59.51	(24.39)

There were no statistically significant differences in quality of life between those with and without facial injuries.

Table 74 shows mean scores on social support, stratified by injury site.

Table 74: Mean scores on social support (CPQ), stratified by site of injury. (N in brackets)

	No facial injury (77)		**Facial injury (96)**	
	Mean	(SD)	Mean	(SD)
Confiding support	15.70	(3.95)	16.19	(3.74)
Practical support	5.58	(2.61)	5.49	(2.75)
Negative aspects	3.14	(2.80)	3.05	(2.54)

There were no statistically significant differences between facial and non-facial injury groups in perceived levels of support.

Table 75 shows coping mechanisms stratified by site of injury.

Table 75: Mean scores on use of coping mechanisms (Brief COPE), stratified by site of injury. (N in brackets)

	No facial injury (70)		Facial injury (92)	
	Mean	(SD)	Mean	(SD)
Acceptance	3.90	(1.63)	4.20	(1.70)
Active Coping	3.27	(1.77)	3.34	(1.94)
Behavioural Disengagement	1.03	(1.74)	0.73	(1.31)
Denial	1.60	(1.91)	1.15	(1.72)
Humour	2.49	(2.18)	2.58	(2.11)
Planning	3.24	(2.05)	3.04	(2.05)
Positive Reframing	2.64	(1.84)	2.84	(1.97)
Self-Distraction	2.07	(1.62)	2.54	(1.81)
Substance Use	0.77	(1.72)	0.66	(1.42)
Self-Blame	2.04	(1.79)	1.73	(1.68)
Using Emotional Support	3.67	(1.92)	4.00	(1.92)
Using Instrumental Support	2.63	(1.96)	2.93	(2.00)
Venting	1.81	(1.94)	1.53	(1.51)
Religion	1.33	(2.13)	1.49	(2.00)

People with a facial injury were significantly more likely to use distraction ($t(160) = -1.72$, $p = .043$). There were no other statistically significant differences.

Table 76 shows childhood trauma scores stratified by site of injury.

Table 76: Mean scores on childhood trauma (CTQ), stratified by site of injury. (N in brackets)

	No facial injury (48)		Facial injury (68)	
	Mean	(SD)	Mean	(SD)
Physical Abuse	5.96	(2.02)	6.93	(3.84)
Emotional Abuse	6.79	(2.97)	7.38	(3.64)
Emotional Neglect	8.73	(4.77)	9.79	(4.99)
Physical Neglect	7.54	(2.97)	7.19	(3.21)
Sexual Abuse	5.02	(0.14)	5.82	(3.05)
Total score	34.04	(9.90)	37.12	(13.78)

There were no statistically significant differences between the facial and non-facial groups.

9.7 Additional tables from Chapter 6 results

Multilevel models: Follow up PTSD only and violence

After analyses were carried out on the combined ASDS and PCL-S measure, the same analysis was done without adding baseline acute stress into the PTSD variable, to use a 'pure' PCL-S outcome.

- After adjusting for days since event and gender, violence was a significant predictor of PTSS at follow up. It was not possible to adjust for age: the model would not converge so no inferences could be drawn. Confidence intervals were very wide.
- Religion was added to the model; violence was no longer significant, although religion was significant. However, confidence intervals and ORs became unworkably large: the LR test indicated that the unadjusted model was the better fit.
- It was not possible to add further adjustments as the model would not converge.

The model is shown in Table 77

Table 77: Adjusted multilevel model for clinically significant PTSS, using PCL-S only (PCL-S scores ≥45). *p<.05 **p<.01 ***p<.001. Adjusted for days since event.

Variable (n)	Values (n)	Adjusted OR [95% CI]		Adjusted OR [95% CI]	
Mechanism of injury (204)	Accidental (157)	1		1	
	Violent (47)	11.96	[0.93,154.56]	16.15	[0.62,421.45]
Gender (204)	Male (146)	1		1	
	Female (58)	7.22	[0.59,87.78]	23.32	[0.70,778.88]
Religion (204)	No religion (89)			1	
	Christian (97)			1.09	[0.09,13.01]
	Other (18)			321.90*	[2.13,48720.88]
p value of likelihood ratio test after estimation				0.0117	

No conclusions could be drawn as the sample was too small at follow up, and odds ratios and confidence intervals were too wide. However, the tendency of the data was similar to the model that included acute stress.

Multilevel models: predictors of PTSD without violence hypothesised as the most important factor

The models examining PTSD began with the assumption that violence would be the strongest predictor. Although it was significant, other factors were stronger. Without this assumption in the model, demographic factors and past mental health might have had a still stronger effect on the odds of PTSD. Therefore, the models were re-run with variables entered in order of highest significance at baseline: this meant violence was entered fourth rather than first.

- As the strongest predictor at baseline, religion was entered into the model first; being in the 'other' group had significantly increased odds of PTSD, after adjusting for days since event, gender and age.
- Employment status was added; although being unemployed was significantly increased the odds of PTSD, the LR test showed this model was not a better fit, so employment status was removed.
- Ethnicity was added: it was not significant and the model was not a better fit of the data; it was removed.
- Violence was added to the model; it was highly significant and proved a better fit for the data.
- Past mental health was added to the model; it was highly significant and proved a better fit for the data.

This process produced the same model as when violence was entered first.

9.8 Questionnaires used

9.8.1 Demographics (prospective study)

Please answer the following questions by writing in or circling your answer.

First name		Surname		
Date of Birth		Hospital Number		
Age		Gender	Male$_1$ / Female$_2$	
Ethnicity - White / White British	White British$_1$	White Other$_2$	Any other white background$_3$ *specify*:	
Ethnicity - Black / Black British	British African$_4$	British Caribbean$_5$	Caribbean$_6$	African$_7$
Ethnicity - Asian / Asian British	British Indian$_8$	British Pakistani$_9$	British Bangladeshi$_{10}$	British Chinese$_{11}$
	Indian$_{12}$	Pakistani$_{13}$	Bangladeshi$_{14}$	Chinese$_{15}$
Ethnicity - Mixed / Multiple ethnic groups	White and black Caribbean$_{16}$	White and black African$_{17}$	White and Asian$_{18}$	Other mixed$_{19}$ *specify*: .....
Other ethnic group$_{20}$ *specify*	.....			

Language	Is English your first language?			Yes$_1$	No$_2$
	If no, what is your first language:				
	If no, how well do you speak English?	Very well$_1$	Well$_2$	Not well$_3$	
What is your religion?	No religion$_1$	Christian$_2$	Buddhist$_3$	Hindu$_4$	Jewish$_5$
	Muslim$_6$	Sikh$_7$	Any other religion$_8$ – *please write in*:		
Place of birth	Were you born in the UK?			Yes$_1$	No$_2$
	If no, please specify country of birth:				
	Were your parents born in the UK?			Yes$_1$	No$_2$
	If no, please specify both parents' country of birth:				

Marital status	Single$_1$	Living with partner$_2$	Married$_3$	Separated$_4$	Divorced$_5$	Widowed$_6$

Please answer the following questions by writing in or circling your answer.

Highest level of education	None 1	GCSE / 'O' level 2 (or equivalent)	'A' level 3 (or equivalent)	Diploma 4 (or equivalent)	Degree or higher degree 5 (or equivalent)
	Other qualification 6 – *please specify:*				
Last week, were you:	In full-time employment 1	Unemployed – looking for work 2	Looking after home or family 3	Student 4	
	In part-time employment 5	Unemployed – not looking for work 6	Long-term sick or disabled 7	Retired 8	
	Other 9 – *please specify:*				

What is your job title?
.....
What do you mainly do in your job? *Please write in, in detail*
....

Monthly household income	What total income did your household receive in the last month, after tax?	
	Less than £85 1	£1,150 less than £1,450 11
	£85 less than £175 2	£1,450 less than £1,700 12
	£175 less than £260 3	£1,700 less than £2,000 13
	£260 less than £350 4	£2,000 less than £2,300 14
	£350 less than £430 5	£2,300 less than £2,600 15
	£430 less than £590 6	£2,600 less than £2,900 16
	£590 less than £720 7	£2,900 less than £4,300 17
	£720 less than £870 8	£4,300 less than £5,500 18
	£870 less than £1,000 9	£5,500 or more 19
	£1,000 less than £1,150 10	Prefer not to say 20

9.8.2 ASDS

Briefly describe the experience/event which led to you coming to hospital:

.....Date of event: .....

Did the experience frighten you?	Yes 1	No 2

Please answer each of these questions about **how you have felt since the event**. *Circle one number next to each question to indicate how you have felt.*

1	2	3	4	5
Not at all	**Mildly**	**Medium**	**Quite a bit**	**Very much**

During or after the trauma, did you ever feel numb or distant from your emotions? 1	1	2	3	4	5
During or after the trauma, did you ever feel in a daze? 2	1	2	3	4	5
During or after the trauma, did things around you ever feel unreal or dreamlike? 3	1	2	3	4	5
During or after the trauma, did you ever feel distant from your normal self or like you were watching it happen from outside? 4	1	2	3	4	5
Have you been unable to recall important aspects of the trauma? 5	1	2	3	4	5
Have memories of the trauma kept entering your mind? 6	1	2	3	4	5
Have you had bad dreams or nightmares about the trauma? 7	1	2	3	4	5
Have you felt as if the trauma was about to happen again (as if you were reliving it)? 8	1	2	3	4	5
Do you feel very upset when you are reminded of the trauma? 9	1	2	3	4	5
Have you tried not to think about the trauma? 10	1	2	3	4	5
Have you tried not to talk about the trauma? 11	1	2	3	4	5
Have you tried to avoid situations or people that remind you of the trauma? 12	1	2	3	4	5
Have you tried not to feel upset or distressed about the trauma? 13	1	2	3	4	5
Have you had trouble sleeping since the trauma? 14	1	2	3	4	5
Have you felt more irritable since the trauma? 15	1	2	3	4	5
Have you had difficulty concentrating since the trauma? 16	1	2	3	4	5
Have you become more alert to danger since the trauma? 17	1	2	3	4	5
Have you become jumpy since the trauma? 18	1	2	3	4	5
When you are reminded of the trauma, do you sweat or tremble or does your heart beat fast? 19	1	2	3	4	5

PCL-S

Briefly describe the event which led to you coming to hospital:

.....

.....Date: DD / MM / YYYY

Below is a list of problems and complaints that people sometimes have in response to stressful life experiences. Please read each one carefully, then circle one of the numbers to indicate how much you have been bothered by that problem **in the past month**.

1	2	3	4	5
Not at all	**A little bit**	**Moderately**	**Quite a bit**	**Extremely**

Repeated, disturbing memories, thoughts, or images of the stressful experience?$_1$	1	2	3	4	5
Repeated, disturbing dreams of the stressful experience?$_2$	1	2	3	4	5
Suddenly acting or feeling as if the stressful experience were happening again (as if you were reliving it)?$_3$	1	2	3	4	5
Feeling very upset when something reminded you of the stressful experience?$_4$	1	2	3	4	5
Having physical reactions (e.g. heart pounding, trouble breathing, sweating) when something reminded you of the stressful experience?$_5$	1	2	3	4	5
Avoiding thinking about or talking about the stressful experience or avoiding having feelings related to it?$_6$	1	2	3	4	5
Avoiding activities or situations because they reminded you of the stressful experience?$_7$	1	2	3	4	5
Trouble remembering important parts of the stressful experience?$_8$	1	2	3	4	5
Loss of interest in activities that you used to enjoy?$_9$	1	2	3	4	5
Feeling distant or cut off from other people?$_{10}$	1	2	3	4	5
Feeling emotionally numb or being unable to have loving feelings for those close to you?$_{11}$	1	2	3	4	5
Feeling as if your future will somehow be cut short?$_{12}$	1	2	3	4	5
Trouble falling or staying asleep?$_{13}$	1	2	3	4	5
Feeling irritable or having angry outbursts?$_{14}$	1	2	3	4	5
Having difficulty concentrating?$_{15}$	1	2	3	4	5
Being "super-alert" or watchful or on guard?$_{16}$	1	2	3	4	5
Feeling jumpy or easily startled?$_{17}$	1	2	3	4	5

9.8.3 HADS

1	**I feel tense or 'wound up'**		8 **I feel as if I am slowed down**
☐	Most of the time$_3$	☐	Nearly all the time$_3$
☐	A lot of the time$_2$	☐	Very often$_2$
☐	From time to time, occasionally$_1$	☐	Sometimes$_1$
☐	Not at all$_0$	☐	Not at all$_0$
2	**I still enjoy the things I used to enjoy**		9 **I get a sort of frightened feeling like 'butterflies' in the stomach**
☐	Definitely as much$_0$	☐	Not at all$_0$
☐	Not quite so much$_1$	☐	Occasionally$_1$
☐	Only a little$_2$	☐	Quite often$_2$
☐	Hardly at all$_3$	☐	Very often$_3$
3	**I get a sort of frightened feeling as if something awful is about to happen**		10 **I have lost interest in my appearance**
☐	Very definitely and quite badly$_3$	☐	Definitely$_3$
☐	Yes, but not too badly$_2$	☐	I don't take as much care as I should$_2$
☐	A little, but it doesn't worry me$_1$	☐	I may not take quite as much care$_1$
☐	Not at all$_0$	☐	I take as much care as ever$_0$
4	**I can laugh and see the funny side of things**		11 **I feel restless as if I have to be on the move**
☐	As much as I always could$_0$	☐	Very much indeed$_3$
☐	Not quite so much now$_1$	☐	Quite a lot$_2$
☐	Definitely not so much now$_2$	☐	Not very much$_1$
☐	Not at all$_3$	☐	Not at all$_0$
5	**Worrying thoughts go through my mind**		12 **I look forward with enjoyment to things**
☐	A great deal of the time$_3$	☐	As much as I ever did$_0$
☐	A lot of the time$_2$	☐	Rather less than I used to$_1$
☐	Not too often$_1$	☐	Definitely less than I used to$_2$
☐	Very little$_0$	☐	Hardly at all$_3$
6	**I feel cheerful**		13 **I get sudden feelings of panic**
☐	Never$_3$	☐	Very often indeed$_3$
☐	Not often$_2$	☐	Quite often$_2$
☐	Sometimes$_1$	☐	Not very often$_1$
☐	Most of the time$_0$	☐	Not at all$_0$
7	**I can sit at ease and feel relaxed**		14 **I can enjoy a good book or radio or television programme**
☐	Definitely$_0$	☐	Often$_0$
☐	Usually$_1$	☐	Sometimes$_1$
☐	Not often$_2$	☐	Not often$_2$
☐	Not at all$_3$	☐	Very seldom$_3$

9.8.4 PMH

Please answer the following questions and feel free to write comments.
Please circle Yes or No to the following questions:

1. Have you ever been treated for depression? YES_1 / NO_2
   If so, please say what year(s).....
2. Have you ever been treated for anxiety? YES_1 / NO_2
   If so, please say what year(s).....
3. Have you ever been prescribed anti-depressants? YES_1 / NO_2
   If so, please say what year(s).....
4. Do you think you have ever suffered from depression? YES_1 / NO_2
   If so, please say what year(s).....
5. Do you think you have ever suffered from anxiety? YES_1 / NO_2
   If so, please say what year(s).....

9.8.5 DAS24

This questionnaire is concerned about how you feel about your appearance.
The first part of the scale is designed to find out if you are sensitive or self-conscious about any aspect of your appearance (even if this is not usually visible to others).

(a) Is there any aspect of your appearance (however small) that concerns you at all?

Yes$_1$ / No$_2$
If No, please got to Q1
If Yes, please continue

(b) The aspect of my appearance about which I am most sensitive or self-conscious is:

.....

From now on, we will refer to this aspect of your appearance as your 'feature'

(c) The thing I don't like about my feature is:

.....

(d) If you are sensitive or concerned about any other features of your body or your appearance, please say what they are:

.....

.....

.....

Instructions: The following questions are concerned with the way you feel or act. They are all simple. Please circle the answer that applies to you. If the item does not apply to you at all, circle the 'Not applicable' option. Don't spend long on any one question.

1. How confident do you feel?

Not at all$_4$	Slightly$_3$	Moderately$_2$	Extremely$_1$

2. How distressed do you get when you see yourself in the mirror/window?

Extremely$_4$	Moderately$_3$	A little$_2$	Not at all distressed$_1$

3. My self-consciousness makes me irritable at home:

Not applicable$_0$	Never/almost never$_1$	Sometimes$_2$	Often$_3$	Almost always$_4$

4. How hurt do you feel?

Extremely$_4$	Moderately$_3$	Slightly$_2$	Not at all$_1$

5. At present my self-consciousness has an adverse effect on my work:

Almost always$_4$	Often$_3$	Sometimes$_2$	Never/almost never$_1$	Not applicable$_0$

6. How distressed do you get when you go to the beach?

Not applicable$_0$	Not at all$_1$	A little$_2$	Moderately$_3$	Extremely$_4$

7. Other people mis-judge me because of my feature:

Almost always$_4$	Often$_3$	Sometimes$_2$	Never/almost never$_1$	Not applicable$_0$

8. How feminine/masculine do you feel?

Not at all$_4$	Slightly$_3$	Moderately$_2$	Extremely$_1$

9. I am self -conscious of my feature:

Not applicable$_0$	Never/almost never$_1$	Sometimes$_2$	Often$_3$	Almost always$_4$

10. How irritable do you feel?

Not at all$_1$	Slightly$_2$	Moderately$_3$	Extremely$_4$

11. I adopt certain gestures (e.g. folding my arms in front of other people, covering my mouth with my hand):

Never/almost never$_1$	Sometimes$_2$	Often$_3$	Almost always$_4$

12. I avoid communal changing rooms:

Almost always$_4$	Often$_3$	Sometimes$_2$	Never/almost never$_1$	Not applicable$_0$

13. How distressed do you get by shopping in department stores/supermarkets?

Not applicable$_0$	Not at all$_1$	Slightly$_2$	Moderately$_3$	Extremely$_4$

14. How rejected do you feel?

Not at all$_1$	Slightly$_2$	Moderately$_3$	Extremely$_4$

15. I avoid undressing in front of my partner:

Not applicable$_0$	Never/almost never$_1$	Sometimes$_2$	Often$_3$	Almost always$_4$

16. How distressed do you get while playing sports/games?

Extremely$_4$	Moderately$_3$	Slightly$_2$	Not at all$_1$	Not applicable$_0$

17. I close into my shell:

Almost always$_4$	Often$_3$	Sometimes$_2$	Never/almost never$_1$

18. How distressed are you by being unable to wear your favourite clothes?

Extremely$_4$	Moderately$_3$	Slightly$_2$	Not at all$_1$	Not applicable$_0$

19. How distressed do you get when going to social events?

Not applicable$_0$	Not at all$_1$	Moderately$_2$	A fair amount$_3$	Extremely$_4$

20. How normal do you feel?

Not at all$_4$	Slightly$_3$	Moderately$_2$	Extremely$_1$

21. At present my self-consciousness has an adverse effect on my sex life:

Almost always$_4$	Often$_3$	Sometimes$_2$	Never/almost never$_1$	Not applicable$_0$

22. I avoid going out of the house:

Almost always$_4$	Often$_3$	Sometimes$_2$	Never/almost never$_1$

23. How distressed do you get when other people make remarks about your feature?

Not applicable$_0$	Not at all$_1$	Moderately$_2$	A fair amount$_3$	Extremely$_4$

24. I avoid going to pubs/restaurants:

Almost always$_4$	Often$_3$	Sometimes$_2$	Never/almost never$_1$	Not applicable$_0$

25. My feature causes me physical pain/discomfort:

Never/almost never$_1$	Sometimes$_2$	Often$_3$	Almost always$_4$

26. My feature limits my physical ability to do the things I want to do:

Almost always$_4$	Often$_3$	Sometimes$_2$	Never/almost never$_1$

9.8.6 Disfigurement scale for participants

Appearance scale

After surgery and/or injuries, some people's appearance can change: they can look visibly different, or disfigured.

Please rate your own appearance on the rating scale provided in which 1 = minimal visible difference and 9 = severe visible difference. You can also tick 'No visible difference'.

Examples are provided below. Please circle the best answer for you.

MINIMAL VISIBLE DIFFERENCE								SEVERE VISIBLE DIFFERENCE
1	2	3	4	5	6	7	8	9

☐ No visible difference

Examples of "1"	*Examples of "5"*	*Examples of "9"*
Disfigured area/scar small in size.	*Disfigured area/scar moderate in size.*	*Disfigured area/scar large in size.*
Difference minimally visible (close range only).	*Difference moderately visible.*	*Difference very visible (visible from afar).*

9.8.7 Disfigurement scale for surgeons

Surgeon-rated disfigurement scale: **face and/or neck disfigurement**
Disfigurement may be defined as a visible and negative alteration in appearance resulting from a disruption of skin, soft tissues or bony structures. The degree of disfigurement may be represented on a continuum ranging from minimal to severe. Please rate each patient you see in terms of **face and/or neck disfigurement** on the rating scale provided in which 1 refers to minimal disfigurement and 9 refers to severe disfigurement. To assist you in making your rating, the following examples are provided:

Example of "1"	Example of "5"	Example of "9"
Disfigured area/scar small in size.	Disfigured area/scar moderate in size.	Disfigured area/scar large in size.
Shape of face/neck not distorted.	Shape of face/neck somewhat distorted.	Shape of face/neck very distorted.
Facial expression not affected.	Facial expression somewhat affected.	Facial expression very affected.
Disfigurement minimally visible (close range only).	Disfigurement moderately visible.	Disfigurement very visible (visible from afar).
MINIMAL DISFIGUREMENT.		**SEVERE DISFIGUREMENT.**

Surgeon

1	2	3	4	5	6	7	8	9

☐ No visible difference

9.8.8 WHOQOL

The following questions ask how you feel about your quality of life. Please tick the answer that appears most appropriate. If you are unsure about which response to give to a question, the first response you think of is often the best one. We ask that you think about your life **in the last two weeks.**

1 How would you rate your quality of life?	
☐	Very poor 1
☐	Poor 2
☐	Neither poor nor good 3
☐	Good 4
☐	Very good 5

How satisfied are you with your health? 2	
Very dissatisfied 1	☐
Dissatisfied 2	☐
Neither satisfied nor dissatisfied 3	☐
Satisfied 4	☐
Very satisfied 5	☐

The following questions ask about **how much** you have experienced certain things **in the last two weeks.**

3 To what extent do you feel that physical pain prevents you from doing what you need to do?	
☐	Not at all 1
☐	A little 2
☐	A moderate amount 3
☐	Very much 4
☐	An extreme amount 5

How much do you need any medical treatment to function in your daily life? 4	
Not at all 1	☐
A little 2	☐
A moderate amount 3	☐
Very much 4	☐
An extreme amount 5	☐

5 How much do you enjoy life?	
☐	Not at all 1
☐	A little 2
☐	A moderate amount 3
☐	Very much 4
☐	An extreme amount 5

To what extent do you feel your life to be meaningful? 6	
Not at all 1	☐
A little 2	☐
A moderate amount 3	☐
Very much 4	☐
An extreme amount 5	☐

7 How well are you able to concentrate?	
☐	Not at all 1
☐	A little 2
☐	A moderate amount 3
☐	Very much 4
☐	An extreme amount 5

How safe do you feel in your daily life? 8	
Not at all 1	☐
A little 2	☐
A moderate amount 3	☐
Very much 4	☐
An extreme amount 5	☐

9 How healthy is your physical environment?	
☐	Not at all 1
☐	A little 2
☐	A moderate amount 3
☐	Very much 4
☐	An extreme amount 5

The following questions ask about how completely you experience or were able to do certain things **in the last two weeks.**

10	**Do you have enough energy for everyday life?**
☐	Not at all 1
☐	A little 2
☐	Moderately 3
☐	Mostly 4
☐	Completely 5

11	**Are you able to accept your bodily appearance?**
☐	Not at all 1
☐	A little 2
☐	Moderately 3
☐	Mostly 4
☐	Completely 5

12	**Have you enough money to meet your needs?**
☐	Not at all 1
☐	A little 2
☐	Moderately 3
☐	Mostly 4
☐	Completely 5

13	**How available to you is the information that you need in your day-to-day life?**
☐	Not at all 1
☐	A little 2
☐	Moderately 3
☐	Mostly 4
☐	Completely 5

14	**To what extent do you have the opportunities for leisure activities?**
☐	Not at all 1
☐	A little 2
☐	Moderately 3
☐	Mostly 4
☐	Completely 5

15	**How well are you able to get around?**
☐	Very poor 1
☐	Poor 2
☐	Neither poor nor good 3
☐	Good 4
☐	Very good 5

16	**How satisfied are you with your sleep?**
☐	Very dissatisfied 1
☐	Dissatisfied 2
☐	Neither satisfied nor dissatisfied 3
☐	Satisfied 4
☐	Very satisfied 5

17	**How satisfied are you with your ability to perform your daily living activities?**
☐	Very dissatisfied 1
☐	Dissatisfied 2
☐	Neither satisfied nor dissatisfied 3
☐	Satisfied 4
☐	Very satisfied 5

18	**How satisfied are you with your capacity for work?**
☐	Very dissatisfied 1
☐	Dissatisfied 2
☐	Neither satisfied nor dissatisfied 3
☐	Satisfied 4
☐	Very satisfied 5

19	**How satisfied are you with yourself?**
☐	Very dissatisfied 1
☐	Dissatisfied 2
☐	Neither satisfied nor dissatisfied 3
☐	Satisfied 4
☐	Very satisfied 5

The following questions ask about how completely you experience or were able to do certain things **in the last two weeks.**

20	How satisfied are you with your personal relationships?
☐	Very dissatisfied 1
☐	Dissatisfied 2
☐	Neither satisfied nor dissatisfied 3
☐	Satisfied 4
☐	Very satisfied 5

How satisfied are you with your sex life?	21
Very dissatisfied 1	☐
Dissatisfied 2	☐
Neither satisfied nor dissatisfied 3	☐
Satisfied 4	☐
Very satisfied 5	☐

22	How satisfied are you with the support you get from your friends?
☐	Very dissatisfied 1
☐	Dissatisfied 2
☐	Neither satisfied nor dissatisfied 3
☐	Satisfied 4
☐	Very satisfied 5

How satisfied are you with the conditions of your living place?	23
Very dissatisfied 1	☐
Dissatisfied 2	☐
Neither satisfied nor dissatisfied 3	☐
Satisfied 4	☐
Very satisfied 5	☐

24	How satisfied are you with your access to health services?
☐	Very dissatisfied 1
☐	Dissatisfied 2
☐	Neither satisfied nor dissatisfied 3
☐	Satisfied 4
☐	Very satisfied 5

How satisfied are you with your transport?	25
Very dissatisfied 1	☐
Dissatisfied 2	☐
Neither satisfied nor dissatisfied 3	☐
Satisfied 4	☐
Very satisfied 5	☐

The following question refers to how often you have felt or experienced certain things **in the last two weeks.**

26	How often do you have negative feelings such as blue mood, despair, anxiety, depression?
☐	Never 1
☐	Seldom 2
☐	Quite often 3
☐	Very often 4
☐	Always 5

The following few questions are concerned with your personal beliefs, and how these affect your quality of life. Once again these questions refer to **the last two weeks**.

27	**Do your personal beliefs give meaning to your life?**
☐	Not at all 1
☐	A little 2
☐	Moderately 3
☐	Mostly 4
☐	Completely 5

28	**To what extent do you feel your life to be meaningful?**
☐	Not at all 1
☐	A little 2
☐	Moderately 3
☐	Mostly 4
☐	Completely 5

29	**To what extent do your personal beliefs give you the strength to face difficulties?**
☐	Not at all 1
☐	A little 2
☐	Moderately 3
☐	Mostly 4
☐	Completely 5

30	**To what extent do your personal beliefs help you to understand difficulties in life?**
☐	Not at all 1
☐	A little 2
☐	Moderately 3
☐	Mostly 4
☐	Completely 5

9.8.9 WEMWBS

Below are some statements about feelings and thoughts.

Please circle the number that best describes your experience of each over the last two weeks.

1	2	3	4	5
None of the time	**Rarely**	**Some of the time**	**Often**	**All of the time**

I've been feeling optimistic about the future$_1$	1	2	3	4	5
I've been feeling useful$_2$	1	2	3	4	5
I've been feeling relaxed$_3$	1	2	3	4	5
I've been feeling interested in other people$_4$	1	2	3	4	5
I've had energy to spare$_5$	1	2	3	4	5
I've been dealing with problems well$_6$	1	2	3	4	5
I've been thinking clearly$_7$	1	2	3	4	5
I've been feeling good about myself$_8$	1	2	3	4	5
I've been feeling close to other people$_9$	1	2	3	4	5
I've been feeling confident$_{10}$	1	2	3	4	5
I've been able to make up my own mind about things$_{11}$	1	2	3	4	5
I've been feeling loved$_{12}$	1	2	3	4	5
I've been interested in new things$_{13}$	1	2	3	4	5
I've been feeling cheerful$_{14}$	1	2	3	4	5

9.8.10 Brief COPE

These questions are about how you've been coping with stress in your life since your injury. Please answer the questions below according to your thoughts and feelings. People's ways of dealing with stress vary over time, but try and think about what you would **usually** do to deal with any stress. Please circle the number that best describes your response next to each statement.

1	2	3	4
I haven't been doing this at all	**I've been doing this a little bit**	**I've been doing this a medium amount**	**I've been doing a lot of this**

I've been turning to work or other activities to take my mind off things.[17]	1	2	3	4
I've been concentrating my efforts on doing something about the situation I'm in.[1]	1	2	3	4
I've been saying to myself "this isn't real".[19]	1	2	3	4
I've been using alcohol or other drugs to make myself feel better.[21]	1	2	3	4
I've been getting emotional support from others.[13]	1	2	3	4
I've been giving up trying to deal with it.[22]	1	2	3	4
I've been taking action to try to make the situation better.[2]	1	2	3	4
I've been refusing to believe that it has happened.[20]	1	2	3	4
I've been saying things to let my unpleasant feelings escape.[23]	1	2	3	4
I've been getting help and advice from other people.[16]	1	2	3	4
I've been using alcohol or other drugs to help me get through it.[24]	1	2	3	4
I've been trying to see it in a different light, to make it seem more positive.[5]	1	2	3	4
I've been criticising myself.[25]	1	2	3	4
I've been trying to come up with a strategy about what to do.[3]	1	2	3	4
I've been getting comfort and understanding from someone.[14]	1	2	3	4
I've been giving up the attempt to cope.[26]	1	2	3	4
I've been looking for something good in what is happening.[6]	1	2	3	4
I've been making jokes about it.[9]	1	2	3	4

1	2	3	4
I haven't been doing this at all	**I've been doing this a little bit**	**I've been doing this a medium amount**	**I've been doing a lot of this**

I've been doing something to think about it less, such as going to the cinema, watching TV, reading, daydreaming, sleeping or shopping.[18]	1	2	3	4
I've been accepting the reality of the fact that it has happened.[7]	1	2	3	4
I've been expressing my negative feelings.[27]	1	2	3	4
I've been trying to find comfort in my religion or spiritual beliefs.[11]	1	2	3	4
I've been trying to get advice or help from other people about what to do.[15]	1	2	3	4
I've been learning to live with it.[8]	1	2	3	4
I've been thinking hard about what steps to take.[4]	1	2	3	4
I've been blaming myself for things that happened.[28]	1	2	3	4
I've been praying or meditating.[12]	1	2	3	4
I've been making fun of the situation.[10]	1	2	3	4

9.8.11 AUDIT

Please circle the answer that is correct for you.

1 How often do you have a drink containing alcohol?	2 How many standard drinks containing alcohol do you have on a typical day when drinking?
☐ Never 0 ☐ Monthly or less 1 ☐ 2-4 times a month 2 ☐ 2-3 times a week 3 ☐ 4 or more times a week 4	☐ 1 or 2 0 ☐ 3 or 4 1 ☐ 5 or 6 2 ☐ 7 to 9 3 ☐ 10 or more 4
3 How often do you have six or more drinks on one occasion?	**4 During the past year, how often have you found that you were not able to stop drinking once you had started?**
☐ Never 0 ☐ Less than monthly 1 ☐ Monthly 2 ☐ Weekly 3 ☐ Daily or almost daily 4	☐ Never 0 ☐ Less than monthly 1 ☐ Monthly 2 ☐ Weekly 3 ☐ Daily or almost daily 4
5 During the past year, how often have you failed to do what was normally expected of you because of drinking?	**6 During the past year, how often have you needed a drink in the morning to get yourself going after a heavy drinking session?**
☐ Never 0 ☐ Less than monthly 1 ☐ Monthly 2 ☐ Weekly 3 ☐ Daily or almost daily 4	☐ Never 0 ☐ Less than monthly 1 ☐ Monthly 2 ☐ Weekly 3 ☐ Daily or almost daily 4
7 During the past year, how often have you had a feeling of guilt or remorse after drinking?	**8 During the past year, have you been unable to remember what happened the night before because you had been drinking?**
☐ Never 0 ☐ Less than monthly 1 ☐ Monthly 2 ☐ Weekly 3 ☐ Daily or almost daily 4	☐ Never 0 ☐ Less than monthly 1 ☐ Monthly 2 ☐ Weekly 3 ☐ Daily or almost daily 4
9 Have you or someone else been injured as a result of your drinking?	**10 Has a relative or friend, doctor or other health worker been concerned about your drinking or suggested you cut down?**
☐ No 0 ☐ Yes, but not in the past year 2 ☐ Yes, during the past year 4	☐ No 0 ☐ Yes, but not in the past year 2 ☐ Yes, during the past year 4

9.8.12 CPQ

This section concerns people in your life who you feel close to and from whom you can obtain support (either emotional or practical) including close relatives and good friends.

How many people do you feel very close to? It does not matter where they live or whether you have seen them recently.

PLEASE WRITE NUMBER IN THIS BOX ☐

Who have you felt closest to in the last 12 months? Please describe in terms of their relationship to you: (e.g. wife, son, aunt, boyfriend, male friend, or female friend). Remember those are just examples and we would like you to write in whoever you feel closest to.

Closest person _____

How much in the last 12 months...

1	2	3	4
Not at all	**A little**	**Quite a lot**	**A great deal**

... did this person give you information, suggestions, and guidance that you found helpful?$_1$	1	2	3	4
... could you rely on this person (was this person there when you needed him/her?)$_2$	1	2	3	4
... did this person make you feel good about yourself?$_3$	1	2	3	4
... would you have liked more practical help with major things from this person?$_4$	1	2	3	4
... did you share interests, hobbies and fun with this person?$_5$	1	2	3	4
... did this person give you worries, problems and stress?$_6$	1	2	3	4

Still thinking about the person you have felt closest to, how much in the last 12 months...

1	2	3	4
Not at all	A little	Quite a lot	A great deal

... did you want to confide in (talk frankly, share feelings with) this person?[7]	1	2	3	4
... did you confide in this person?[8]	1	2	3	4
... did you trust this person with your most personal worries and problems[9]	1	2	3	4
... would you have liked to confide more in this person?[10]	1	2	3	4
... did talking to this person make things worse?[11]	1	2	3	4

How much in the last 12 months...

1	2	3	4
Not at all	A little	Quite a lot	A great deal

... did he/she talk about his/her personal worries with you?[12]	1	2	3	4
... did you need practical help from this person with major things (e.g. look after you when ill, help with finances, children)?[13]	1	2	3	4
... did this person give you practical help with major things[14]	1	2	3	4
... did this person give you practical help with small things when you needed it? (e.g. chores, shopping, watering plants, etc.)[15]	1	2	3	4

These questions are about people who live outside your household.

1	2	3	4	5	6
Almost daily	**About once a week**	**About once a month**	**Once every few months**	**Never/ almost never**	**No relatives/ friends outside household**

How often do you have regular contact with *relatives* outside your household, by visits, telephone, letters or email? In total, is it...16	1	2	3	4	5	6
How often do you regularly visit or are visited by *relatives* who live outside your household? In total, is it...17	1	2	3	4	5	6
How often do you have regular contact with *friends or acquaintances* outside your household, by visits, telephone, letters or emails? In total, is it...18	1	2	3	4	5	6
How often do you visit or are you visited by *friends or acquaintances* who live outside your household? In total, is it...19	1	2	3	4	5	6

9.8.13 CTQ

Please circle the number that best describes your experience.
When I was growing up…

1	2	3	4	5
Never true	**Rarely true**	**Sometimes true**	**Often true**	**Very often true**

I didn't have enough to eat.[1]	1	2	3	4	5
I knew that there was someone to take care of me and protect me.[2]	1	2	3	4	5
People in my family called me things like "stupid", "lazy" or "ugly".[3]	1	2	3	4	5
My parents were too drunk or high to take care of the family.[4]	1	2	3	4	5
There was someone in my family who helped me feel I was important or special.[5]	1	2	3	4	5
I had to wear dirty clothes.[6]	1	2	3	4	5
I felt loved.[7]	1	2	3	4	5
I thought that my parents wished I had never been born.[8]	1	2	3	4	5
I got hit so hard by someone that I had to see a doctor or go to hospital.[9]	1	2	3	4	5
There was nothing I wanted to change about my family.[10]	1	2	3	4	5
People in my family hit me so hard that it left me with bruises or marks.[11]	1	2	3	4	5
I was punished with a belt, a board, a cord, or some other hard object.[12]	1	2	3	4	5
People in my family looked out for each other.[13]	1	2	3	4	5
People in my family said hurtful or insulting things to me.[14]	1	2	3	4	5
I believe I was physically abused.[15]	1	2	3	4	5
I had the perfect childhood.[16]	1	2	3	4	5
I got hit or beaten so badly that it was noticed by someone like a teacher, neighbour or doctor.[17]	1	2	3	4	5
I felt that someone in my family hated me.[18]	1	2	3	4	5
Someone tried to touch me in a sexual way, or tried to make me touch them.[19]	1	2	3	4	5
Someone threatened to hurt me or tell lies about me unless I did something sexual with them.[20]	1	2	3	4	5
I had the best family in the world.[21]	1	2	3	4	5

1	2	3	4	5
Never true	Rarely true	Sometimes true	Often true	Very often true

Someone tried to make me do sexual things or watch sexual things.[22]	1	2	3	4	5
Someone molested me.[23]	1	2	3	4	5
I believe that I was emotionally abused.[24]	1	2	3	4	5
There was someone to take me to the doctor if I needed it.[25]	1	2	3	4	5
I believe I was sexually abused.[26]	1	2	3	4	5
My family was a source of strength and support.[27]	1	2	3	4	5

9.8.14 LTE

Have any of the following life events or problems happened to you **during the last 6 months**? Please tick the box for yes or no.

	Yes	No
You yourself suffered a serious illness, injury or an assault.1	1	2
You yourself suffered a serious illness, injury or an assault, excluding the one you were treated in hospital for.0	1	2
A serious illness, injury or assault happened to a close relative.2	1	2
Your parent, child or spouse/partner died.3	1	2
A close family friend or another relative (aunt, cousin, grandparent) died.4	1	2
You had a separation due to marital difficulties.5	1	2
You broke off a steady relationship.6	1	2
You had a serious problem with a close friend, neighbour or relative.7	1	2
You became unemployed or you were seeking work unsuccessfully for more than one month.8	1	2
You were sacked from your job.9	1	2
You had a major financial crisis.10	1	2
You had problems with the police and a court appearance.11	1	2
Something you valued was lost or stolen.12	1	2
In the past six months do you think anything has happened that has caused you a lot of stress?13	1	2

If YES, what was it?14.....

.....

.....

9.8.15 Treatment needs questions (pilot study)

First name:		Surname:	
Date of Birth:	DD / MM / YYYY	Hospital Number:	
Gender	Male / Female		
Ethnicity (*please circle*)	White British$_1$	White other$_2$	Asian$_3$	Asian British$_4$
	Black$_5$	Black British$_6$	Chinese$_7$	
	Mixed$_8$ *(please specify)*:			
	Other ethnic group$_9$ *(please specify)*:			
Date of first appointment at this clinic			DD / MM / YYYY
Would you be willing to be contacted by a member of the clinical team to take part in future studies?			Yes / No

1. Who accompanied you to the clinic today? *Please tick all that apply.*

- ☐ Alone
- ☐ Partner
- ☐ Children
- ☐ Sibling
- ☐ Parent
- ☐ Other – please say who:.....

2. Since you started your treatment at this clinic, have you approached any of the following people about your emotional needs? *Please tick all that apply.*

- ☐ GP
- ☐ Counsellor
- ☐ Psychologist
- ☐ Psychiatrist
- ☐ A patient support group
- ☐ A religious or spiritual adviser (such as a vicar, priest, imam)
- ☐ Family or friends – please say who:.....
- ☐ Consultant Surgeon
- ☐ Nurse
- ☐ Social Worker
- ☐ Other – please say who:.....

☐ I have not seen anyone about emotional needs

3. If recommended by your treatment team, who would you be willing to see? *Please tick all that apply.*

- ☐ Counsellor
- ☐ Psychologist
- ☐ Psychiatrist
- ☐ Social Worker
- ☐ Patient Support Group
- ☐ Other Patients
- ☐ Nurse
- ☐ Other – please say who:.....

☐ I would not be willing to see anyone

4. Please circle the best answer for you.

1	2	3	4
Strongly agree	**Agree**	**Disagree**	**Strongly disagree**

I was given enough information about my condition. 1	1	2	3	4
I feel that my surgeon listens to me. 2	1	2	3	4
I am satisfied with the way in which the hospital staff have attended to my physical and medical needs. 3	1	2	3	4
I am satisfied with how hospital staff have attended to my emotional needs. 4	1	2	3	4
My psychological needs have been addressed. 5	1	2	3	4
My surgeon involves members of my family in my treatment. 6	1	2	3	4
My family members need further support. 7	1	2	3	4

5. What areas do you think you need support in? *Please tick all that apply.*

- ☐ Coping with my condition physically
- ☐ Coping with my condition emotionally
- ☐ Financial help
- ☐ Social support
- ☐ Other – please say what.....

☐ Do not need support

9.9 Recruitment documents

9.9.1 Patient information leaflet: facial trauma

Wellbeing after Facial Injury

Participant Information

Before you decide whether you wish to take part in this study it is important for you to understand why the research is being carried out and what it will involve. Please take the time to read the following information carefully. If you wish, you can discuss the information with others and our research staff will also be happy to help you. Please ask us if there is anything that is not clear or you would like more information and take your time in deciding whether or not you wish to take part.

What is the purpose of the study?

- **The purpose of the study is to investigate how the emotional wellbeing of patients with facial injuries can be improved.**
- Some people who have had facial injuries may go on to experience problems such as distress about changes to their appearance and problems with social and functional adjustment.
- We will be focusing on the effects of social support and relationships on patients' treatment outcome and quality of life.
- What we learn from this study will be used to help develop treatments to improve the wellbeing of facial injury patients.

Do I have to take part?

- There is no obligation for you to take part in this study.
- If you do decide to take part you will be given this information sheet to keep and you will be asked to sign a consent form.
- You will be able to withdraw from the study without giving a reason at any time while we are collecting information from participants.

What will happen to me if I decide to take part?

- If you choose to take part in this study, you will be asked to complete a series of questionnaires and take part in an interview.

What questions will the questionnaires ask?

- The questionnaires include questions about your thoughts and feelings about your injury, your experiences before and during any surgery, and how other people have helped you during this experience. If you find any of these questions upsetting or prefer not to answer certain questions it is fine to leave them out. If the questionnaire raises any issues you would like to discuss please let us know.

When do I complete the questionnaires and how long will the questionnaires take?

- Questionnaires will be completed at 3 time points (soon after injury, 3 months after injury and 6 months after injury) which will usually fit in with your normal clinic appointments.

- You may receive several questionnaires at each time point which can take between 30-45 minutes to complete. If you require help filling in any of the questionnaires someone will be available to help.
- Your questionnaires do not all need to be completed at the same time, they can be filled in at home or at the clinic, whichever you find most convenient. If completed at home all postage will be paid by us.

When does the interview take place?

- 3 months after your injury you will be asked to take part in an interview. This will be at a time and place of your choice and will take about one hour of your time.
- Interviews can take place at the clinic or on the phone.
- The interview will be conducted by a trained member of the research team and will include questions related to your past and present health and wellbeing.
- The interview will be audio recorded to assist with future analysis. If you require a copy of your own interview this can be provided upon request.

Why is the interview recorded?

- As we are interested in your personal experience the interview will be audio recorded to ensure we don't miss any important information for the analysis.
- All information will be kept confidential and no one apart from the research team will have access to the recordings.
- Once the recordings have been analysed they will be destroyed.

What are the photographs for?

- We are interested in how you feel about your appearance, and how this relates to any changes to your appearance after the injury.
- We will take a photograph of you within a few weeks of your injury. When you take part in the follow-up in three months and six months' time, you can send us a photo, by email or by post.

Do I have to be photographed?

- No. You can choose not to be photographed or to submit photos and still take part in the rest of the study.

Will anyone else see the answers to my questionnaires or interview?

- **No – all answers to the questionnaires and the interview will be kept confidential.**
- The information gathered in this trial will be coded so that no one will be able to identify you from the data that will be used in the analyses.
- Only the people involved in this study will have access to the data.

What will happen to the data collected?

- The results from your questionnaires and the interview will be stored under a code number that does not contain any of your personal details. Only the research team will be able to link all of your data for the purpose of analysing your results.
- All of the data will be stored in locked filing cabinets, or kept on password protected computers.
- **No one but the people involved in this study will have access to your data.**

What are the possible disadvantages of taking part?

- There are no risks in taking part in the study.

What are the possible benefits of taking part?

- There is no direct benefit to you. The purpose of the study is to provide information on what kinds of factors influence quality of life, stress symptoms and problems adjusting to appearance: the aim of the study is to improve treatment for people with facial injuries.

What happens when the research study stops?

- Your data may be used for further analysis after you have finished participating in the study.

What will happen to the results of the research study?

- The results from the study will be published in medical and scientific journals.
- **You will not be identified in any report or publication arising from this study.**
- There may also be a presentation at Saving Faces or other service user groups which you will be invited to attend.

Who is organising and funding the research?

- Researchers at Queen Mary University of London are organising the research together with the surgeons at participating facial injury clinics.
- The doctors and surgeons will not receive any special or additional payment if you agree to participate in the study.
- This research is funded by Saving Faces.

Who has reviewed the study?

- This study was given a favourable ethical opinion for conduct in the NHS by the NRES Committee London - Camberwell St Giles (Ref: 12/LO/0351).

Please note that as we are a teaching hospital, medical students may be present in the clinics and may be involved in the research project. **Please let the researcher know if you prefer that they should not be present during your involvement in the research project.**

Contacts for further information

If you have any questions or concerns about this study please contact your consultant or one of the research staff based at Queen Mary's.

Research staff – Emmylou Rahtz
Phone no. 020 7882 2026
Email e.rahtz@qmul.ac.uk

Research staff – Farah Shiraz
Phone no. 020 7882 2045
Email f.shiraz@qmul.ac.uk

Chief Investigator – Prof Ania Korszun – Honorary Consultant Psychiatrist
Phone no. 020 7882 2026 / 020 7882 2045
Email a.korszun@qmul.ac.uk

Consultant Surgeon and Clinical Director – Prof Iain Hutchison
Phone no. 07889 473 916

For impartial information on patient research please contact:
Patient Advisory Liaison Service (PALS). Tel: 020 359 42040/42050 or email pals@bartsandthelondon.nhs.uk

Saving Faces has an expert patient helpline talk to other patients who have experienced the same condition or gone through similar surgery. Tel: 07792 357972 or email: helpline@savingfaces.co.uk

If at any point you wish to make a formal complaint you may contact:
Jarrard O'Brien
Quality Development
Barts and The London NHS Trust
Healthcare Governance Directorate
3rd Floor, Prescot Street
020 7480 4857
Jarrard.obrien@bartsandthelondon.nhs.uk

9.9.2 Patient information leaflet: major trauma

Wellbeing after Injury

Participant Information

Before you decide whether you wish to take part in this study it is important for you to understand why the research is being carried out and what it will involve. Please take the time to read the following information carefully. If you wish, you can discuss the information with others and our research staff will also be happy to help you. Please ask us if there is anything that is not clear or you would like more information and take your time in deciding whether or not you wish to take part.

What is the purpose of the study?

- **The purpose of the study is to investigate how the emotional wellbeing of patients with injuries can be improved.**
- Some people who have had injuries may go on to experience problems such as distress about changes to their appearance and problems with social and functional adjustment.
- We will be focusing on the effects of social support and relationships on patients' treatment outcome and quality of life.
- What we learn from this study will be used to help develop treatments to improve the wellbeing of injury patients.

Do I have to take part?

- There is no obligation for you to take part in this study.
- If you do decide to take part you will be given this information sheet to keep and you will be asked to sign a consent form.
- You will be able to withdraw from the study without giving a reason at any time while we are collecting information from participants.

What will happen to me if I decide to take part?

- If you choose to take part in this study, you will be asked to complete a series of questionnaires and take part in an interview.

What questions will the questionnaires ask?

- The questionnaires include questions about your thoughts and feelings about your injury, your experiences before and during any surgery, and how other people have helped you during this experience. If you find any of these questions upsetting or prefer not to answer certain questions it is fine to leave them out. If the questionnaire raises any issues you would like to discuss please let us know.

When do I complete the questionnaires and how long will the questionnaires take?

- Questionnaires will be completed at 3 time points (soon after injury, 3 months after injury and 6 months after injury) which will usually fit in with your normal clinic appointments.

- You may receive several questionnaires at each time point which can take between 30-45 minutes to complete. If you require help filling in any of the questionnaires someone will be available to help.
- Your questionnaires do not all need to be completed at the same time, they can be filled in at home or at the clinic, whichever you find most convenient. If completed at home all postage will be paid by us.

When does the interview take place?

- 3 months after your injury you will be asked to take part in an interview. This will be at a time and place of your choice and will take about one hour of your time.
- Interviews can take place at the clinic or on the phone.
- The interview will be conducted by a trained member of the research team and will include questions related to your past and present health and wellbeing.
- The interview will be audio recorded to assist with future analysis. If you require a copy of your own interview this can be provided upon request.

Why is the interview recorded?

- As we are interested in your personal experience the interview will be audio recorded to ensure we don't miss any important information for the analysis.
- All information will be kept confidential and no one apart from the research team will have access to the recordings.
- Once the recordings have been analysed they will be destroyed.

What are the photographs for?

- We are interested in how you feel about your appearance, and how this relates to any changes to your appearance after the injury.
- We will take a photograph of you within a few weeks of your injury. When you take part in the follow-up in three months and six months' time, you can send us a photo, by email or by post.

Do I have to be photographed?

- No. You can choose not to be photographed or to submit photos and still take part in the rest of the study.

Will anyone else see the answers to my questionnaires or interview?

- **No – all answers to the questionnaires and the interview will be kept confidential.**
- The information gathered in this trial will be coded so that no one will be able to identify you from the data that will be used in the analyses.
- Only the people involved in this study will have access to the data.

What will happen to the data collected?

- The results from your questionnaires and the interview will be stored under a code number that does not contain any of your personal details. Only the research team will be able to link all of your data for the purpose of analysing your results.
- All of the data will be stored in locked filing cabinets, or kept on password protected computers.
- **No one but the people involved in this study will have access to your data.**

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- There are no risks in taking part in the study.

What are the possible benefits of taking part?

- There is no direct benefit to you. The purpose of the study is to provide information on what kinds of factors influence quality of life, stress symptoms and problems adjusting to appearance: the aim of the study is to improve treatment for people with injuries.

What happens when the research study stops?

- Your data may be used for further analysis after you have finished participating in the study.

What will happen to the results of the research study?

- The results from the study will be published in medical and scientific journals.
- **You will not be identified in any report or publication arising from this study.**
- There may also be a presentation at Saving Faces or other service user groups which you will be invited to attend.

Who is organising and funding the research?

- Researchers at Queen Mary University of London are organising the research together with the surgeons at participating injury clinics.
- The doctors and surgeons will not receive any special or additional payment if you agree to participate in the study.
- This research is funded by Saving Faces.

Who has reviewed the study?

- This study was given a favourable ethical opinion for conduct in the NHS by the NRES Committee London - Camberwell St Giles (Ref: 12/LO/0351).

Please note that as we are a teaching hospital, medical students may be present in the clinics and may be involved in the research project. **Please let the researcher know if you prefer that they should not be present during your involvement in the research project.**

Contacts for further information

If you have any questions or concerns about this study please contact your consultant or one of the research staff based at Queen Mary's.

Research staff – Emmylou Rahtz
Phone no. 020 7882 2026
Email e.rahtz@qmul.ac.uk

Research staff – Farah Shiraz
Phone no. 020 7882 2045
Email f.shiraz@qmul.ac.uk

Chief Investigator – Prof Ania Korszun – Honorary Consultant Psychiatrist
Phone no. 020 7882 2026 / 020 7882 2045
Email a.korszun@qmul.ac.uk

Consultant Surgeon and Clinical Director – Prof Iain Hutchison
Phone no. 07889 473 916

For impartial information on patient research please contact:
Patient Advisory Liaison Service (PALS). Tel: 020 359 42040/42050 or email pals@bartsandthelondon.nhs.uk

Saving Faces has an expert patient helpline talk to other patients who have experienced the same condition or gone through similar surgery. Tel: 07792 357972 or email: helpline@savingfaces.co.uk

If at any point you wish to make a formal complaint you may contact:
Jarrard O'Brien
Quality Development
Barts and The London NHS Trust
Healthcare Governance Directorate
3rd Floor, Prescot Street
020 7480 4857
Jarrard.obrien@bartsandthelondon.nhs.uk

Thank you for reading this.

9.9.3 Patient consent form: facial trauma

Wellbeing after Facial Injury

PATIENT CONSENT FORM

Names of Researchers: Prof Ania Korszun, Prof Kam Bhui, Prof Iain Hutchison, Mr Simon Holmes, Emmylou Rahtz and Farah Shiraz.

Centre Number: 1 Participant ID Number:

	Please initial box
1. I confirm that I have read and understand the information sheet dated 24.08.12 (version 3) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time up to the point of complete data collection, without giving any reason, without my medical care or legal rights being affected.	☐
3. I understand that relevant sections of any of my medical notes and data collected during the study may be looked at by responsible individuals from Barts and The London, Queen Mary's School of Medicine and Dentistry, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.	☐
4. I agree to take part in the questionnaire assessments in the above study.	☐
5. I understand that my interview will be audio recorded and agree for this to take place.	☐
6. I understand that I will be photographed and agree for this to take place. I can also submit photographs three months and six months from now.	☐

_____ Name of Patient	_____ Date	_____ Signature
_____ Name of person taking consent (if different from researcher)	_____ Date	_____ Signature
_____ Researcher	_____ Date	_____ Signature

9.9.4 Patient consent form: major trauma

Wellbeing after Injury

PATIENT CONSENT FORM

Names of Researchers: Prof Ania Korszun, Prof Kam Bhui, Prof Iain Hutchison, Mr Simon Holmes, Emmylou Rahtz and Farah Shiraz.

Centre Number: 1 Participant ID Number:

Please initial box

1. I confirm that I have read and understand the information sheet dated 18.02.13 (version 3) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time up to the point of complete data collection, without giving any reason, without my medical care or legal rights being affected. ☐
3. I understand that relevant sections of any of my medical notes and data collected during the study may be looked at by responsible individuals from Barts and The London, Queen Mary's School of Medicine and Dentistry, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records. ☐
4. I agree to take part in the questionnaire assessments in the above study. ☐
5. I understand that my interview will be audio recorded and agree for this to take place. ☐

_____	_____	_____
Name of Patient	Date	Signature
_____	_____	_____
Name of Person taking consent (if different from researcher)	Date	Signature
_____	_____	_____
Researcher	Date	Signature

When completed: 1 for patient; 1 for researcher site file; 1 (original) to be kept in medical notes.

9.10 Qualitative analysis of vignettes: methods and results

The following extract is reproduced verbatim, with permission, from Ms Skinner's MSc thesis. For brevity, the introduction, discussion and references are excluded.

Accounts of Physical Trauma: A Thematic Analysis

Hannah Skinner

Queen Mary, University of London

Wolfson Institute of Preventative Medicine

Date of Submission: 13.08.14

Abstract

Physical trauma is a leading cause of death worldwide and is thought to be associated with a variety of mental health disorders as a result. However little is known about the way survivors with related mental health disorders choose to communicate their narratives of events. Accounts of trauma survivors including, victims of motor vehicle collisions, stabbings, accidents, muggings, and attacks were analysed using a thematic analysis methodology. Five main themes were deducted from the data: The Future, Positivity, Powerlessness, Memory and Uncertainty, and Pain and Death. From the analysis, patterns in verbal communications were highlighted as potential indications of areas of focus for healthcare professionals. These could serve as markers for quicker and more accurate diagnoses.

Keywords: physical trauma, explanations, depression, anxiety, acute stress disorder

Aims and Objectives

The aim of this study was:

- To identify possible needs of participants within the thematic analysis that may be addressed within mental health services.
- To identify possible participant concerns within the thematic analysis that may be addressed within mental health services.

Both aims are to be considered with a long term view to improving treatments, attending to the needs of patients faster, and reducing rates of unnoticed negative mental health signs.

The objectives of this study, enabling me to work towards my aim were to:

- Systematically analyse data, on an idiosyncratic case-by-case level, allowing for full immersion in the data.
- Find common themes throughout the data, indicating core areas of interest within participants when communicating their experiences.
- Cross reference themes drawn out from the data with previous literature for association and uniqueness with regards to the sample and area of investigation.

Method

For the purposes of the true reflexivity necessary for a qualitative analysis, I will now write in first person. It should be noted that this research is a secondary analysis; all data used in this research were not collected by me. The data were collected as part of a PhD project by the main researcher Emmylou Rahtz, investigating predictors and treatment outcomes in traumatic injury patients. Emmylou is both academically and professionally accomplished in qualitative research. She is a trained and practised interviewer, and has experience of face-to-face interviewing in both group and individual settings, and telecommunication interviewing. The chief investigator of the study was Professor Ania Korszun. Since the qualitative data, collected in the form of individual vignettes, was outside of the scope of the core PhD research question it was made available as a unique source of information for analysis as part of a separate research project.

This research was designed to use a qualitative analysis. The reason behind this was to gain an individual understanding of how patients of physical trauma choose to communicate their personal experience of events, using the vignettes collected by the main researcher. Furthermore by using qualitative analysis it is possible to explore both commonalities within the data, or important factors contributed by a minority of participants. My epistemological position could influence my reasons for choosing to do a qualitative analysis, as I am a critical realist. Therefore I would argue that whilst individual viewpoints are considered a personal reality open to adaptation, it does not mean they are representative of a whole. However I do not discount that commonalities in realities could be present for a shared experience. In other words a critical realist contends that meanings are independent or individualist, yet there are existent layers that intertwine in societal beliefs (Bhaskar 1979; Pratten 2013). It is through the exploration of narratives that these layers emerge. Therefore, in the current study data was analysed using a critical realist approach whereby participant responses were viewed neither as representative of intrinsic views, nor insignificant statements. Data were perceived as idiosyncratic realities, with the potential for population construct (Lyons & Chamberlain 2006), in other words collective participant responses may be grouped in a way that may reflect the population being studied.

Recruitment and Participants

All participants in the study were recruited from the Royal London Hospital trauma clinics. Participants were approached by researchers on ward with information about the study. This information included the researcher, the organisation affiliated with the study, and the aims of the study. Upon interest in participation, they were then informed of what will be involved in the process of the research, their rights as a participant, what will happen with their data, and the key contact details of researchers involved. If participants consented to take part in the study, they were given the opportunity to begin that day, or at a time suitable for them in the coming days. The majority of participants were recruited and interviewed on the same day. The sampling method was therefore one of opportunity.

Participants were screened for mental health problems: depression, anxiety and ASD using validated self-report questionnaires (see Measures). Participants were screened for ASD rather than PTSD as data were collected within 30 days of the trauma, and thus a diagnosis of PTSD would not be possible in this time frame. For the PhD research study participants were excluded if they were under the age of 18, had current symptoms of active psychosis, were in hospital as a result of attempted suicide, or could not speak English. Participants were included if they were undergoing surgery following traumatic injury, were over the age of 18, and had no cognitive impairments

judged by clinic staff. For this research existing participants were sorted with regards to their mental health screening and only those who scored as highly distressed were included for qualitative analysis. This was to ensure heterogeneity within the sample and adherence to the mental health element of the research question. A total of 217 participants were included in the main study. Of these participants a total of 45 vignettes for participants scoring highly for mental health difficulties were considered usable by the main researcher due to their detail and time frame of collection. During analysis three participants were removed due to incoherence within the vignette, a minimal amount of information, or a lack of interview answers altogether due to patient refusal. Therefore a total of 42 vignettes were analysed. Participants were aged between 18 and 62, including 33 males and nine females. Results from the mental health screening showed that of these 42 participants, 22 scored highly for depression and anxiety only, 8 scored highly for ASD only, and 12 scored highly in both mood disorder and ASD questionnaires.

Data Collection and Measures

Participants were presented with consent forms at the start of their involvement in the research. All data were collected face-to-face in a private environment to maximise patient confidentiality and comfort. Participants were given individual personal identification codes for anonymity consisting of their participant number, their ward reference, and a combination of letters. Questionnaires were administered at the first meeting with the participants, and included the Hospital Anxiety and Depression Questionnaire (HADS; Zigmond & Snaith 1983), the Acute Stress Disorder Scale (ASDS; Bryant, Moulds & Guthrie 2000), and demographic survey questions (see Appendix A). Scores were coded as clinically significant or not, based on pre-established cut off markers. A score of more than 55 for the ASDS or 8 or more on the HADS was considered significant. Participants were then interviewed using semi-structured questions agreed upon by the researcher and chief investigator. These included questions such as “Talk me through what happened”, “Do you remember everything clearly?”, and “Some people, when they’ve had an accident/incident like this feel a sense of serious threat to their life. Did you have any feelings like that?” For a full list of questions used see Appendix B. Further prompts were given if answers were inconclusive, or of particular interest to the researcher. However if the participant was under noticeable distress from the interview question, no prompt was given and the next question was addressed. Furthermore if the participant was distressed due to the nature of the interview as a whole, they were given the opportunity to terminate the interview. Each interview lasted approximately ten minutes, and answers were recorded in note form by the researcher. It is important to note that although the researcher used notation to record answers to questions, participants’ own terminology, or

expression of words were used. Moreover direct quotations from the participant were clearly marked on the vignettes to differentiate the two types of data. Measures were taken to increase the validity of the vignettes by regular discussions with the chief investigator and main researcher regarding interview technique coherence, and the minimisation of researcher bias in note-taking. Moreover vignettes were supplemented with case notes and information discussed in multi-disciplinary team meetings held on ward for measuring reliability of information provided by the participant. Furthermore validity was a concern for the current research, as I had no contact with the participants and had no input in data collection. Therefore regular discussions were held with the main researcher to discuss case information and consult or clarify data within vignettes. It was within these meetings that the decision was made to remove three vignettes from data analysis due to their incoherence or lack of narrative as the interview was cut short.

Data Analysis

When choosing a method of qualitative analysis it was agreed that the most appropriate method suitable was a thematic analysis due to the nature of the vignettes. The data are not in the form of transcripts from recordings, they are researcher notes of the interviews with true quotes where possible; there is not a full word-for-word account of participant responses to questions. This is because the data was not intended for analysis during the PhD study, thus ethical applications for full recordings were not conducted. Methods such as Interpretive Phenomenological Analysis (Smith & Osborn 2003), Discourse Analysis (Willig 2003), Conversation Analysis (Forrester 2010), and Narrative Analysis (Murray 2003) are not applicable for this research as the data are not sufficiently detailed for these approaches. Furthermore a Grounded Theory methodology (Glaser & Strauss 1966) does not seem suitable for the limited dimensions of this particular data set. However, the flexibility Thematic Analysis offers in both epistemology and theoretical construct marks a highly suitable form of analysis for the current data set.

Thematic analysis is used for identifying, analysing, and reporting themes within data; it is a way of minimally organising data in rich detail (Boyatzis 1998). Whilst traditionally used as a starting point for other methodology such as Grounded Theory, thematic analysis is becoming an analytic method more commonly used on its own (Braun & Clark 2006). However, there are no well established guidelines for performing this type of analysis leaving it open to researcher interpretation and personal systematic development. Nevertheless the analysis of the current data set was conducted following steps advised by Braun and Clark (2006). The data were read and re-read on a singular case level in order to fully immerse myself in the vignettes. Once familiarised, an initial set of codes were generated as I worked through each vignette; the number of codes

increased as the data were explored. Once all vignettes had been coded, I then re-read and analysed the data again to ensure that later codes had been considered for all participants. A full list of coding can be found in Table 1. Specific extracts were then collated into tables alongside participant identification codes, and primary comments were noted alongside quotations to prompt further exploration of data, see Appendix B. Potential themes were then formulated accounting for appropriateness, inter-code relationships, overlap, and selected extracts through mind mapping and diagrammatic representation, see Figure 1. The themes were then discussed and reviewed for appropriateness with the main researcher, who is knowledgeable of the data content and participant narratives.

The themes discussed in the results were those that satisfied criteria suggested by Braun and Clark; they should appear in approximately one third of participants or more, or be of particular interest to the analysis. Some of the codes that did not fall into a thematic category will be discussed in relation to themes. Furthermore, it should be noted that some codes were established from direct questions prompted by the researcher such as *Memory* and *Intoxication.* However, they have been included as it was believed that particular insight may be drawn from participant communications.

The participants were also given a code detailing what type of physical trauma they suffered. For example, participants who were involved in a motor vehicle collision have been coded with the abbreviation MVC. Full details of codes used can be found in Table 2. Moreover to gain a better understanding of who has been quoted in the extracts used, participants were also given a second identification code. This is to ensure the reader has a clear image of who the data represents. These codes consisted of gender, age, and physical trauma code. Therefore if participant number five was a male participant, aged 36, who was involved in an MVC he would be identified by the marker 5; M-36-MVC*.* Furthermore direct quotes taken from the participants as marked by the main researcher are denoted through the use of quotation marks.

Table 1. Initial codes constructed from analysis and prevalence between participants.

Initial Code	Abbreviation	Number of Participants
Uncertainty of Location	Ul	1
Uncertainty of Incidence	Ui	10
Concerns about Appearance	Ap	5
Intoxication	I	16
Taken Advantage of	Ad	4
Trust	Tr	4
Memory (lack of)	M	15
Protective Factors	Pr	28
Death	D	17
Planning for the Future	Pl	12
Description of Perpetrator	Dp	10
Helplessness	H	17
Future Concerns of Safety	Fs	9
Heroism	Her	14
Unknown Why it Happened to Them	Uw	6
Somatic Description	S	20
Repeated Memories	Rm	1
Making Light of What Happened	L	6
Self-Blame	SB	10
Punishment	P	5
Waiting Time	Wt	12
Fear of Redundancy/ Financial Worries	R	5

Note. All initial codes are listed above in the order of which they were developed from the data.

Table 2. Codes constructed for the depiction of traumatic event suffered.

Type of Traumatic Event	Abbreviation
Accident	ACC
Attacked	ATT
Attacked at Home	ATH
Shooting/ Gun Shot Wound	GSW
Motor Vehicle Collision	MVC
Mugging	MUG
Potential Health Issue	PHI
Stabbed	STA

Note. Participant with the code PHI was in the trauma ward after collapsing due to a physical health problem. One participant has a double code of ACC/MVC due to the situation he placed himself in; the participant jumped from a moving vehicle.

Results

Five themes were identified during the analysis of data; Positivity, Powerlessness, The Future, Memory and Uncertainty, and Pain and Death as shown in Figure 1. Whilst some themes appear more frequently than others, all are justifiably relevant for analysis; all themes are recurrent within participant vignettes and contribute to the analysis and investigation of the research question. Each theme is supported by extracts taken from the individual vignettes.

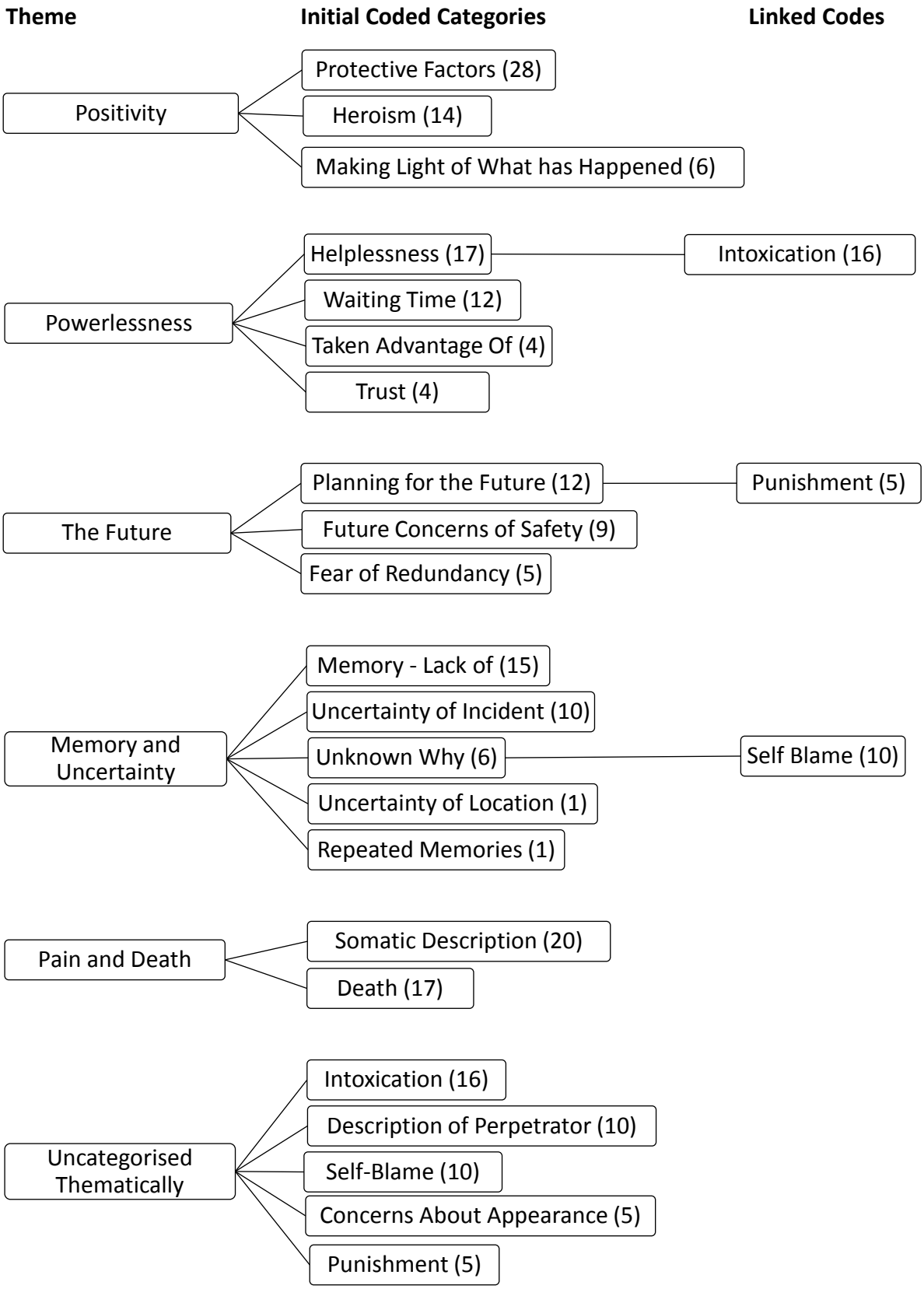

Figure 1. A diagrammatic representation of the sorting process of initial codes into themes, detailing relationships with inter-thematic codes and unsorted codes.

Positivity

Many participants chose to communicate themes of positivity throughout their narratives. The subthemes from the data were *Protective Factors, Heroism,* and *Making Light of What Has Happened.* Although there were fewer participants that seemed to 'make light' of their situation I feel it is an important aspect of analysis to add to the results, as this may be a coping strategy.

Protective Factors.

From the extracts coded as protective factors, it was deduced that there were three types of protection; participants communicated about coping strategies, future protective factors, and situational protective factors. A number of participants communicated the notion of being lucky in their circumstances.

> "I'm lucky I didn't hurt myself more." (35; F-62-ACC)
>
> "Lucky really." (20; M-24-MVC)

He hopes someone will buy him a new bike, his is in bits, this makes him feel lucky that he's not worse off. (16; M-30-MVC)

It would seem that one type of coping mechanism used was to reflect upon the traumatic event in a way that perhaps makes them feel better about their situation. Participant 16 in particular had the chance to reflect on how he survived the trauma in relation to his motorcycle, enabling him to assess the damage that may have been possible.

Then a nurse said she would put him to sleep, and he seemed to have felt safer; he knew he would feel safer eventually. (9; M-19-STA)

The Royal London Hospital has good treatment here. (38; M-45-MUG)

"Hospital will do anything to help." (26; M-59-ACC)

Another positive coping strategy participants appear to be communicating is their gratitude and faith in the medical professionals looking after their wellbeing. By communicating they feel well cared for this is potentially a method of internally validating everything will be OK. It may be that by praising those in charge of their care, participants are more able to feel positive about their situation following the trauma. Alternatively it is possible that positive comments directed at the medical professionals may have been the result of social desirability and wanting to appear to be a 'good patient' (Coser 1962; Taylor 1979); participants may have believed, contrary to being told that

information passed between them and researchers would be confidential, that their praise would be given to the hospital staff and in return the participants would look more socially desirable. However this is not something that can be known for certain.

Tangible to the extracts used to demonstrate planning for the future, participants seem to communicate the future in a protective sense.

[Participant's] wife has been in every day. [He has] one child, one due in 2 weeks. (12; M-29-MVC)

[He is] keen to get home. [He] will stay with girlfriend – she is pregnant. They are moving in together soon. (5; M-25-MVC)

[Participant] lives just with dad. Mum lives near, both will look after him. (20; M-24-MVC)

Participants are emphasizing the input of family members as a protective source. Participant 20 is a prime example of this; he is stating that he although he lives with his father, both parents are near enough and will look after him. Moreover participants 12 and 5 are both inferring that the upcoming birth of a new child is a positive future prospect that may be deemed a protective factor for their recovery from the trauma.

It was common that participants spoke positively about protective factors related to the events at the time of the trauma and the situation they were in.

[Her] 12 year old son found her, he rang partner then ambulance. (42; F-38-ACC)

[A] woman stopped and phoned ambulance, she kept speaking to him. Calmed him down a bit. (41; M-36-MVC)

When with his friends, they looked after him, wrapped him up. (9; M-19-STA)

The extracts above reflect participants being thankful for both people they know and strangers, protecting them at the time of the event. The participants may also be talking about a defusing of responsibility onto someone else at the scene as a way of protecting themselves against what is happening; the son takes control of the situation, the woman phoned the ambulance for him staying with him to calm him down, and his friends wrapped him up and looked after him. However there are differences between other participants when speaking about people being viewed as a protective factor at the time of trauma.

Worried for family. (30; F-58-ACC)

Panicking about his kids. (22; M-47-STA)

Interestingly these participants show that they were thinking of other people rather than themselves at the time of traumatic injury. They could be alluding to this as a coping mechanism for surviving; they were too concerned by what would happen to their families that they fought to survive, thus protecting themselves against the psychological and emotional impact of their injuries.

With regards to coping with the reality of the injury, the influence of others as a form of protection appears to be important enough to communicate for a large number of participants. However, one fascinating observation is the lack of spirituality within the data as a protective factor within individuals. There was one participant who stated "There has been a lot of prayer" (24; M-21-GSW), yet they are the only person noted to have said anything of a spiritual nature with regards to coping with what has happened and protecting themselves from the trauma. It would appear that physical human support was more influential than spiritual. However, as mentioned, some comments may have been made as a result of perceived social desirability, and therefore can be attributed to demand characteristics.

Heroism.

The use of heroism in the accounts given by participants can be found through statements of concern for others and bravery. These are regarded as positivity as participants are divulging altruistic and courageous testimonies.

Two extracts have been chosen to represent participant heroism through concern for others above themselves.

He is very accepting of [the] fact other patients might need help before him...He's worried about the guy getting other people. (22; M-47-STA)

...saw a car coming and pushed her friend out of way, couldn't get out of way herself. (37; F-23-MVC)

Participant 22 communicated that he was worried about the welfare of other people. Similarly he backs this up by saying that the perpetrator has not been arrested. This may be argued to be a separate concern for his safety, however I feel it is more directed at the future safety of others. Participant 37 is another good example of communicating concern for others as she behaved heroically at the time of the trauma by putting the life of her friend ahead of her own. These may be positive coping mechanisms for dealing with trauma; the concept of actively putting others ahead of you may be rewarding in certain situations. It is possible that the extract taken from participant 37 is a way of communicating bravery. However there are other participants that are more explicit in this.

The extracts below represent communication about bravery through the dictation of not being scared.

[He was] not really frightened. The stab felt like a punch. He pulled the knife out. (11; M-35-STA)

Family was more scared than he was. (29; M-59-ACC)

Not worried about seeing the gang again..."I'm not the type to be scared or to freak out. I'm not scared of death." (9; M-19-STA)

[Participant] was on leave from the army. [He has] done two tours in Afghanistan, fine. (39; M-27-ACC)

Being brave and the suppression of fear are often thought to be highly associated; as children we are taught to be brave and not be fearful of things. Therefore it is not surprising that participants may choose to communicate their bravery in this manner. Furthermore, by saying aloud that you were not frightened, this may be a way of protecting personal esteem. Participant 9 states in the extract that he is not the type to be scared or freak out, yet earlier in the interview he says 'he kind of knew something had happened, but didn't want to freak himself out'. This is somewhat of a contradiction of what he has said about not being the type to freak out. Therefore it may be that he felt the need to mention his bravery regarding death as a means of preserving esteem. Alternatively it may be more concerned with how he appears and that he wanted to communicate bravado about him; that he can stand up to a gang. Interestingly participant 39 has made a point of saying that he is a member of the army and has been on two tours of Afghanistan. This may be a way of validating his bravery as he was in the trauma ward due to an alcohol related accident, of which he may have felt did not reflect his true self especially if he identifies as brave.

Some extracts from the participants demonstrate the representation of heroism through communications of fighting.

Participant defended himself and beat the guy up using his hands...[participant has] been in major fights before, a lot when young, for no reason. (44; M-18-ATT)

Participant fought him off. (23; M-19-STA)

"Normally I fight everyone so I fought back." (18; M-25-STA)

She didn't think she would die. She's a "fighter". (28; F-19-MVC)

Participants 44, 23, and 18 all give a semantic description of physical fighting. It may be that they are denoting courage against their perpetrator, a trait often used to demonstrate heroism. Interestingly though participant 28, the only female to talk about fighting, chooses to communicate this point in a latent characteristic representation. She deems herself a "fighter" in the spiritual sense rather than being physically involved in a fight. She may be telling us she is emotionally and physically brave, without behaving in an aggressive way. All the participants however appear to be communicating aspects of heroism in the extracts used.

Making Light of What Has Happened.

Some of the participants chose to relay notions of humour and make light of their situation during their interview. It appears that participants have tried to take a positive stance on what has happened to them by using reflective humour in some cases.

> "A story to tell one day." (22; M-47-STA)

> "Funnily enough, I haven't cried yet." (30; F-58-ACC)

[Participant] works out a lot, feels flabby at the moment in hospital, but he's OK because he's "cheeky." (3; M-21-MVC)

> [He was] joking around in the ambulance. (39; M-27-ACC)

Participants 22 and 30 have reflected on their circumstances, and it may be that they have started to see what happened as an anecdote or perhaps not as serious as they first imagined. Furthermore participant 3 makes a joke about his physical condition and how it is not a problem for him because he is "cheeky". Interestingly participant 39 mentions being able to make jokes at the time of the event; this may however be a reflection of the events of his personal trauma. He was in an accident whilst climbing a fence after having had a 'few beers'. Moreover it could be that he was able to make light of his situation as he is in the army, and therefore may have been witness to more life threatening physical trauma.

Participants have communicated their experiences of trauma in a way that includes positivity through the depiction of protective factors, bravery, courage, and humour. This finding is not adverse to previous literature as support and humour are noted as significantly associated with trauma patients' recovery process (Abel 2002; Bonanno 2005).

Powerlessness

The theme powerlessness was developed using initial codes *Helplessness* and *Waiting Time.* There was a general sense of uncontrollability and vulnerability within the extracts insinuating a sense of powerlessness. Codes *Taken Advantage Of* and *Trust* did not have enough participants or importance for me to further analyse.

Helplessness.

The concept of being helpless to the traumatic situation was present in numerous participant explanations of their experience of physical trauma. Some participants chose to communicate helplessness through the notion of losing control of the situation, whilst others talked about being alone at the time of injury.

There were a number of participants who demonstrated their helplessness through communicating their loss of control.

[Participant] was trapped in a cab until the fire brigade came. (43; M-40-MVC)

> His car wouldn't start...[there were] three including him versus six of them. (9; M-19-STA)
>
> The ladder wobbled then "went." (35; F-62-ACC)
>
> [He] tried to jump but it squashed him against the wall of the container. (36; M-43-ACC)
>
> ...he tripped and they got him. (44; M-18-ATT)

Participants 35 and 36 are a good example of this concept as they were involved in an accident they had no control over; the ladder fell from beneath her, and the item participant 36 was holding fell and squashed him. In both circumstances there would have been no control over what was happening to them, and thus they were helpless to the trauma.

> He [participant] was alone waiting. No one helping him. (11; M-35-STA)
>
> [He] was alone when van hit him. (20; M-24-MVC)

Luckily neighbours were there, otherwise no one would have seen or heard her fall. (30; F-58-ACC)

[He] was alone in flat when it happened. (33; M-49-ACC)

Participant perceptions of their safety and the presence (or absence) of others at the time are very common within narratives. Through mentioning the absence of people at the time of the physical trauma, participants may be expressing their vulnerability to the situation. It may be that they feel the situation could have been different if someone were there at the time. This is shown through the

extract taken from participant 30, who recognises that if there were no witnesses to her accident she may have been less lucky. Participant 11 is explicit in expressing his helplessness; he was stabbed, and clearly states that no one was helping him - dictating his true vulnerability. Interestingly, two of the participants who communicated their vulnerabilities through being alone (participants 11 and 20), also made comments about having been drinking at the time of the incident.

> [Participant] had a drink, four-five cans of beer. (11; M-35-STA)
>
> [He] was drinking. (20; M-24-MVC)
>
> [He had] a couple of drinks...five pints. (38; M-45-MUG)
>
> ...beer – a lot- [he] lost count. [A] normal big night out. (40; M-23-ACC/MVC)
>
> [He] had had some drink, "a bit", but he doesn't know how much. (15; M-53-PHI)

Many of the participants refer to their own alcohol consumption in relation to their injuries. It seems that alcohol may have had a big part in a large proportion of the traumatic events. In terms of helplessness, alcohol has been known to decrease inhibition and therefore it is possible that having had a drink can lead to higher vulnerability. However it is not always the participant that was intoxicated.

Some of the participants wished to communicate that it was the perpetrator who was intoxicated.

> A drunk man was annoying people on the street, got "all lairy". (22; M-47-STA)
>
> "...he was a bit mental, took some kind of drug..." (29; M-24-GSW)
>
> [The] other driver had alcohol on his breath. (43; M-40-MVC)

This is interesting since participant 43 was also inferring that he had little control over the situation he was in. It may be that with the other party involved in the trauma being under the influence, this may increase the victim's helplessness and powerlessness over the circumstances; the participants had little control over what the other person would do whilst intoxicated.

Waiting Time.

When analysing the vignettes for references to waiting times, it was important for me to remember that the main researcher had asked direct questions related to the time participants had to wait for

aid. However it has been included in the further analysis because there is an interesting recurrence of powerlessness present in the descriptions given by participants regarding waiting times.

> Felt like ambulance took a long time. (27; F-27-GSW)
>
> Eventually picked up by friend's girlfriend. (29; M-24-GSW)

Ambulance called but seemed slow, so he was put in car...but ambulance seemed very slow to him. (24; M-21-GSW)

When the ambulance finally came... (9; M-19-STA)

There is an intriguing distinction between participants who were happy with the waiting time, and those that may have felt powerless or vulnerable as a result of it (see Appendix C for full list of extracts available). The participants who were unhappy with the amount of time they waited for aid were mostly gunshot wound victims. There may be a link between powerlessness in this instance and the type of trauma suffered, for example a greater sense of magnitude may be current in certain traumatic situations over others. Moreover it may be that those who were clearly injured at the hands of others felt more vulnerable generally, making them more impatient or scared for their lives. In the case of participants 27 and 24 there is a lack of clarity over the actual waiting time, therefore this may be due to the traumatic stress suffered at the time of injury.

The presence of powerlessness within the explanations given by participants is indicated from extracts taken from both helplessness and waiting time analyses. It seems that participants may have wished to express feelings of powerlessness through the perceived lack of control over their surroundings, picking up on intoxication and proximity to others.

The Future

Many participants chose to communicate their traumatic injury involving an aspect of the future. The subthemes generated from the data are *Planning for the Future,* and *Future Concerns of Safety.* Fear of Redundancy was also deduced from participant narratives, although less often.

Planning for the Future.

Two different aspects of planning for the future were deduced from the data; participants either communicated in a neutral or a negative way about what was to come next for them. The extracts taken from participants below indicate a neutral stance on where they plan to go next.

Participant is going to get own place. (23; M-19-STA)

When discharged will go to them [son and ex-partner] for a few days. (43; M-40-MVC)

[He] plans to stay with his brother after his. (17; M-40-ATH)

His girlfriend lives on the ground floor, he will stay there. (38; M-45-MUG)

For many of the other participants involved in the research communication about the trauma involved a suggestion of where they will go after they have been discharged. Extracts chosen from participants 23, 43, 17, and 38 are good examples of this. Aside from participant 23, who communicates plans to find his own place, perhaps to feel safer than where he resides now, there seems to be a trend of participants surrounding themselves with loved ones. It may be possible that this is due to convenience, as participant 38 states his girlfriend lives on the ground floor, which may be easier for mobility with his injury. However it is also possible that this is a coping strategy for the near future, which may be seen as a positive aspect in recovery. This may be the case for participant 17 as he was attacked at home and may not wish to return. Therefore it may be argued that although they are neutral in their statements, an air of positivity could be inferred from their statements.

[Participant] was due to start art foundation degree now, may still catch up. (28; F-19-MVC)

Participant 28 is a particularly good example as even though she has been involved in a motor vehicle collision, delaying the start to the art degree she was due to begin at the time; she is indicating that there may be a chance she is able to catch up on any work missed. It would appear that she is planning to continue regardless of what has happened to her, thus putting a positive spin on the future as a positive future plan.

Some of the statements made by participants were more negatively valenced than others.

[She is] worried this may set her back … [She] may have to get rid of puppy. (30; F-58-ACC)

[She is] moving to US in March, if possible with partner, but maybe not if financial situation gets difficult. (37; F-23-MVC)

[He is] worried about walking again. (2; M-39-ACC)

In the case of participant 30 she appears to be worried that not only will she have to lose the puppy (previously stated to have been purchased to give her joy), but also that the traumatic experience may set her back emotionally. Participants 37 and 2 also give the impression to be communicating

about being 'set back', as participant 37 appears worried she may not be able to continue her plans to move, whilst participant 2 is concerned that he may not be able to walk again.

In relation to some of the analyses conducted in this particular grouping, Punishment may be seen to be related to future planning. A number of participants wished to communicate future plans detailing the punishment of those believed to be responsible for their trauma. For example participant 19 (M-26-MVC) states that he is 'angry at the woman- there will be legal stuff- not yet though'. This is arguably quite an explicit future plan for the practical punishment of the woman believed to have caused the collision. Alternately a more latent remark was communicated by participant 18 (M-25-STA), who said "and I hope they go to hell" possibly symbolising the negative spiritual future of the perpetrator.

Future Concerns of Safety.

There are two distinctions between participant communications within the boundaries of future concerns of safety. The participants seem to be either worried about returning home, or their future health. There is a trend in participants communicating their uncertainty around the safety of going home after the trauma.

Can't go back to old house, does not feel safe. (13; M-36-ATH)

She wants to get out, but doesn't want to go home because it happened ten minutes away. Someone was arrested but [she] still doesn't want to. (27; F-27-GSW)

[He] doesn't want to go back to the other place. (17; M-40-ATH)

[He is] scared of it happening again. They know his house; someone tried to burgle it the next day – them…Scared of being in that house. (44; M-18-ATT)

It is not unexpected that the participants most concerned about their safety and returning home are those that were attacked at home or nearby. Interestingly it could be argued that participant 44 very clearly communicates that the reason he does not want to go home is due to the possibility of being victim to another traumatic event, whilst participants 13 and 17 are less explicit even though they were attacked at home. It may be that the memory of the trauma is particularly difficult for them, and therefore they do not want to contemplate it happening again too overtly. In the case of participant 27, her communications suggest that she is fearful of returning home even though she was shot ten minutes away and someone has been arrested for the crime.

[He] needs keyhole surgery and is really worried. Never had that kind of surgery before… He's very worried about [his] collapsed lung, [it] keeps reoccurring. (18; M-25-STA)

[It] "has frightened me a bit". (15; M-53-PHI)

He was worried about leg and pain. (34; M-21-MVC)

The extracts above have been taken from participants that seem to be concerned about their future health. Participant 18 communicates that he is worried about not only his lung, a problem that he is dealing with recurrently, but also the surgery he will undergo. It may be that he is concerned about his safety during the operation, having already gone through physical trauma. Participant 34 also conveys unease over their health, but with regards to the future state of his leg. Moreover Participant 15 communicates being frightened as the trauma itself was a result of an unmaintained health problem. Therefore it seems probable that he could be concerned about his future safety should his particular problem continue and cause him injury again. In the case of physical concerns it is possible that participants are expressing themselves in a way that suggests a need for support through their anxieties.

Participants have chosen to communicate aspects of the future within the narratives of their traumatic experience, something not uncommon in narrative research (Jonsson, Josephsson, & Kielhofner 2000; Kielholfner, Braveman, Finlayson, Paul-Ward, Goldbaum, & Goldstein 2004). It would appear that there is a focus on planning for the future, with a divide between participants on whether they take a positive or a negative approach to the near future. Furthermore participants seem to want to communicate concerns for their future safety. It may be that they are looking for validation of their concerns, or subtly asking for support.

Memory and Uncertainty

Within the theme Memory and Uncertainty, there were two subthemes that I felt were suitable for further analysis. These were *Memory,* and *Uncertainty of Incident.*

Memory.

A large number of the participants communicated problems with their memories of the events. Although it is important to remember that this may be the result of a direct question asked about what they can remember, some interesting ideas can be developed through reading the extracts.

There appears to be a divide between the participants who describe their memories as vague, and those who may wish to forget the incident.

The extracts chosen from the participants below demonstrate the lack of memory or vagueness in recall of events.

> His memories are vague, remembers bits, no big blank just vagueness. (26; M-59-ACC)

Vaguely remembers grabbing out as she fell. Then all very vague...her memories are vague for a long time...was it the drugs, she wonders. (30; F-58-ACC)

There are several blanks. (43; M-40-MVC)

[He] doesn't know how long it took, [his] memories are not clear. (10; M-26-MVC)

There is an interesting disparity of the attribution of memory loss in the extracts. The participants that use the term 'vague' were both involved in accidents, whereas the latter two extracts belong to people who were in a motor vehicle collision. It could be that there is confusion over what happened for those in accidents potentially related to their circumstances; interestingly both participants were injured from a fall and therefore have some confusion as to how this happened. Moreover participant 30 attributes her confusion externally, placing possible blame for her lack in memory on drugs administered by the medical professionals.

Interestingly some extracts display signs of dissociation of events.

No sense of threat to life, because [he] doesn't remember. (20; M-24-MVC)

> Doesn't remember impact or pain, glad she doesn't. (37; F-23-MVC)

> [it] "has frightened me a bit", but mostly it's a blank. (15; M-53-PHI)

In the extract from participant 37, her explicitness about feeling glad that she has no memory of the impact of the collision or the pain she felt at the time suggests that she may be deliberately clouding the memories. It is possible to infer this of participant 15 also, as he has communicated his retrospective fear of the trauma and cannot remember events clearly. Participants 20 and 37 both scored highly on the ASD scale, therefore it is possible that dissociation of memory may be a symptom of their condition at the time of interviewing. However it is important to recognise that memory loss may result in a higher score on the ASDS, therefore a question of cause and effect could be queried. Participant 20 states that he did not feel a sense of threat to his life because he does not remember; it may be that he is using dissociation as a coping mechanism and a way of

protecting his psyche from the events that unfolded. Moreover it is possible that the notion of dissociation also applies to the previous extracts used as examples for vagueness as the majority of them scored highly for ASD. However the first set of extracts has less semantic examples of dissociation; they are not as explicit in the suggestion that the lack of memory is a potential protective factor.

Uncertainty of Incident.

Uncertainty of incident refers to the confusion felt by participants, apparently unrelated to their lack of memory. There are multiple aspects of uncertainty present within the vignettes; participants communicated uncertainty of what happened, and uncertainty of how it happened. Furthermore some participants mentioned not knowing why the traumatic happened, related to the code *Unknown Why it Happened to Them.*

The participants communicate confusion over what happened to them during the time of traumatic injury however they focus on different aspects of their confusion.

[She] thinks maybe she fell down stairs...wonders if someone put something in her drink. (1; F-38-ACC)

She didn't realise immediately what had happened; [she] thought it was a firework, then her friend said "I've been shot in the heart" and she realised. Was a few seconds later. (27; F-27-GSW)

He turned and saw flashes; because of adrenalin...he wasn't sure what happened. (24; M-21-GSW)

Participant 27 denotes that time was a factor associated with her uncertainty; she talks about not understanding what happened until a few seconds after her friend explained she had been shot. Whereas participant 24 relates his uncertainty to a potential biological stress related phenomenon. It appears that his perception of why he is confused was due to a chemical imbalance during the trauma. Participant 1 may seem to attribute externally, by suggesting that her confusion was the result of someone else putting something in her drink, however it may be argued that she is also insinuating a lack of clarity due to a chemical imbalance as a result of being drugged. Nevertheless, what actually happened to her in this respect is unknown.

There is uncertainty over how the injuries happened.

> [She] went under the car, doesn't know how she got under it. (28; F-19-MVC)

[He] was gonna cut wood [on a job] with circular electric chop saw, and somehow chopped through right hand. [Participant right handed so doesn't know how that happened]. (33; M-49-ACC)

[He] doesn't know how he got out, [he] thinks he was thrown out of a window. (17; M-40-ATH)

This may be a result of lack of memory; participant 17 communicates that he doesn't know how he got out of his house whilst being attacked which may be a result of him having a blackout or due to the incident happening in the middle of the night having woken him up. Participants 28 and 33 however are more uncertain about the logistics of how they were injured. For example participant 33 knows he put the saw through his right hand, but is unable to ascertain how he managed it as he would have been holding the saw in the same hand.

[He] doesn't know why [he was attacked], doesn't know if they were thieves or not, will see if anything is missing when discharged. (6; M-43-ATH)

[He] still doesn't know what he [the attacker] wanted...when you've had an argument or fight you know to watch your back, but this just came out of the blue. (29; M-24-GSW)

[There was] no warning or lead up. [She is] still not clear what happened. [There was] no argument or fight. (27; F-27-GSW)

[He] doesn't know any reason why anyone would want to hurt him. (10; M-26-MVC)

An uncertainty of why events happened, and more importantly why it happened to them in particular, is often referred to the in perpetrator's intentions. Participants seem not to know why the perpetrator carried out their actions, or why they were the victims. Moreover this seems to be more common in participants who have experienced violence. Their explanations allude to uncontrollability and spontaneity of events. In particular this is communicated in the extracts taken from participants 29 and 27, as they both talk about escalation to aggressive behaviour alongside their confusion over the timing of their injuries. However not all participants are unclear as to why their injuries happened.

He [participant] didn't have a seatbelt and knew he would go through screen. (43; M-40-MVC)

"It was my fault"...pissed off with myself. (20; M-24-MVC)

She [participant] says it was her fault. (28; F-19-MVC)

I was so tired, came down the hill, didn't see the car. (31; F-43-MVC)

Extracts taken from the code *Self-Blame* seem to suggest that in some cases participants are aware that the incident causing their physical trauma was their own fault. Noticeably a large amount of

participants communicating self-blame were involved in a MVC. This is almost the opposite to participants who experienced violence; there appears to be less confusion as to why the incident happened to them as they see themselves as the cause.

There are notable communications of both memory loss and confusion within participants' explanations of traumatic events. Interestingly they seem to attribute these differently in their narratives. Furthermore there is a lack of participant communication about re-experiencing their traumas through repeated memories. This is somewhat surprising as recurrent recollection of trauma is a condition often present in people diagnosed with ASD. It may be that the interviews were conducted too soon after the injury for participants to experience this. However there was one participant who reported experiences of intrusive memories "...been having repeating memories...trying to forget" (23; M-19-STA).

Pain and Death

The theme Pain and Death was generated through incorporating initial codes; subthemes of *Somatic Descriptions* and *Death.* Both were relevant for analysis as a large proportion of the participants chose to communicate their experiences of traumatic injury through describing the pain they felt and their cognitions of death at the time.

Somatic Descriptions.

There were two separate ways participants chose to explain their somatic experiences deduced from the data; the use of similes to describe pain, and verbally quantifying the pain. It was particularly interesting to infer two distinct yet prevalent uses of somatic description between the participants.

The way the participants choose to communicate their somatic sensations through the use of similes is particularly interesting.

[His difficulties in breathing following the attack] "felt like a punch in the chest." He got his own stuff together and went to a friend's. (13; M-36-ATH)

> The stab felt like a punch, he pulled the knife out. (11; M-35-STA)
>
> "It was like ringing in your head, but I felt it in my leg." (24; M-21-GSW)

They seem to choose to explain the pain in a way that they may have experienced before, or possibly assume other people may understand. For example participant 24 may assume that the main

researcher has experienced a ringing sensation in her head, and therefore chose that particular simile to get his point across. It is intriguing that both participants 11 and 13 have used the simile 'like a punch' to describe different circumstances of discomfort; participant 11 is describing the sensation of being stabbed, whereas participant 13 is describing being unable to breath properly. Furthermore both participants seem to use this phrase as a precursor to what happened next in their narrative. It could be that they have chosen to describe the feeling of being punched as a method of normalising or lessening the traumatic event during their storytelling process. However it is also possible that they genuinely believed they had been punched in the first instance.

[There was] "loads" of blood coming out of me. (18; M-25-STA)

[Participant was] in a lot of pain. (37; F-23-MVC)

[Participant's] leg buckled up. "Amazing pain."...[participant] "couldn't get my head around what was wrong"...unbelievable pain...pain all the time "like never felt before". (41; M-36-MVC)

A lot of pain. (36; M-43-ACC)

Some of the participants chose to communicate their pain in a quantitative way rather than using similes, using phrases such as 'loads' or 'all the time'. Furthermore the use of other adjectives such as 'amazing' or 'unbelievable' in the case of participant 41 may also be subjectively quantitative; the participant may be trying to communicate the pain they felt by using experiential adjectives. Conversely it may be that participants were in so much pain that they found it hard to explain metaphorically or to quantify it, thus having to settle with the description of being in 'a lot' of pain.

Death.

One of the questions participants were asked about during the interviews was related to whether they experienced any threat to life at the time of their traumatic injury therefore the concept of death was present in many of the vignettes. However there was an interesting divide in the way that participants responded to this question. It would seem that participants wanted to communicate their experiences of fear of death during their narratives.

[Participant] felt afraid of dying, 90% of the medics and police through he would die from very severe injuries [according to participant]. (12; M-29-MVC)

He was afraid for his life. "Very scared, didn't know if I was going to live or die."(18; M-25-STA)

[Participant experienced] pain and fear while waiting, screaming. [Her] daughter was very frightened too, and thought [participant] would have a heart attack. (35; F-62-ACC)

Interestingly, the three accounts are all somewhat different to one another, especially since few participants chose to communicate their fear as explicitly. For example participant 12 seems like he wanted to justify his fear by stating the professionals thought he would die also, whereas participant 18 seems to communicate his existentiality dichotomously; will he live, or will he die? Furthermore, participant 35 mentions screaming and the fear of her daughter that something further may have happened to her health.

A large proportion of participants communicated their experiences of death in such a way that they may allude to the possible acceptance of death at the time of injury.

> "I felt I will die in this moment, nothing else." (13; M-36-ATH)
>
> When lying in road, [participant] thought "that was it." (37; F-23-MVC)
>
> "This is it." (43; M-40-MVC)

[Participant] thought he was in danger when he saw blood shooting out of artery...he started thinking he wouldn't make it. (22; M-47-STA)

"They knew my breathing was tight, and I'm slowly dying." (9; M-19-STA)

This is not something that is surprising as physical trauma accounts for a large fraction of death annually (Lyn-Sue et al. 2006). What is interesting, however, is the differences in the way participants chose to communicate their existential finality. Participants 13, 37, and 43 for example, sound like the realisation was sudden and that they may have died quite quickly. On the other hand participants 22 and 9 seem like the process of realisation and that the death itself would have lasted longer and been more drawn out. This may be due to the type of injury, as both of these participants suffered stab wounds. Furthermore there was another participant that was also stabbed who talks about the time taken to reach possible acceptance of death.

> "I slowly started giving up." (9; M-19-STA)
>
> "I felt like I'd had enough." (24; M-21-GSW)

The extract taken from participant 9 is a good example of using the concept of time as a way to communicate acceptance of death. He talks about slowly giving up, which may suggest that if he was accepting what was to come, it may have been due to having no other option but to or potentially little energy to carry on. Similarly from what participant 24 has said it is possible to infer that he may also have had to consider giving up and accepting their existential circumstance.

The use of somatic description and reference to death in participants' explanations of events may give us an interesting insight into the behaviour of somatic acceptance, for example normalising pain to be able to understand it better or putting a quantity on what you are feeling, and also the potential acceptance of death. Moreover it is possible to see from the extracts that there may be differences in acceptance of death, whether that is through sudden realisation or slowly giving up on the situation you are in.